Mathematicians and Mathematics in "Czech Lands" (fragments)

Jiří Veselý

Institute of Mathematics CAS

November 25, 2020

Organized and supported

EUROPEAN UNION
European Structural and Investment Funds
Operational Programme Research,
Development and Education

MINISTRY OF EDUCATION,
YOUTH AND SPORTS

The training is aimed at the researchers of the Institute of Mathematics of the Czech Academy of Sciences.

The cost of the training is covered from the OPVVV project CZ.02.2.69/0.0/0.0/18 054/0014664

Institute of Mathematics CAS goes for HR Award – implementation of the professional HR management

Our Limits

We shall limit ourselves on

- **Bohemia, Moravia, Czech Silesia**
  (a part of Czech Kingdom, Holy Roman Empire, Austrian Empire, Austro-Hungarian Empire, . . .)
- **in the time from app. 1300 to app. 1950s**
- **"Czech" mathematicians, including**
- **some foreigners living in Czech lands**
- **some Czech mathematicians which were active abroad**
- **mainly in chronological order and framed by general history**

Founder of The University of Prague

Charles IV

Father:
John I (John the Blind), King of Bohemia and Holy Roman Emperor (*1296 – †1346)

Mother:
Elizabeth of Bohemia (Přemyslid dynasty) (1292 – 1330)

They were married in 1310

Son Wenceslaus (*1316 – †1378)
(since his confirmation in France Charles)

- **2 months in 1319 imprisoned at Loket Castle**
- **several years isolated at Křivoklát Castle**
- **1923 sent to France (for 7 years)**
- **educated by Pierre de Rosieres (1291 – 1352) [Pope Clement VI (1342 – 1352)]**

Founder of the University of Prague

Charles IV

- **since 1347 King of Bohemia**
- **fluent in 5 languages (German, French, Latin, Italian, Czech)**
- **in 1348 founded "full university" in Prague**
- **since 1355 King of Italy and Holy Roman Emperor**

wives: Blanche of Valois, Anna of Bavaria, Anna von Schweidnitz, Elizabeth of Pomerania

Son Wenceslaus IV of Bohemia (*1361 – †1419) (son of Charles' third wife)

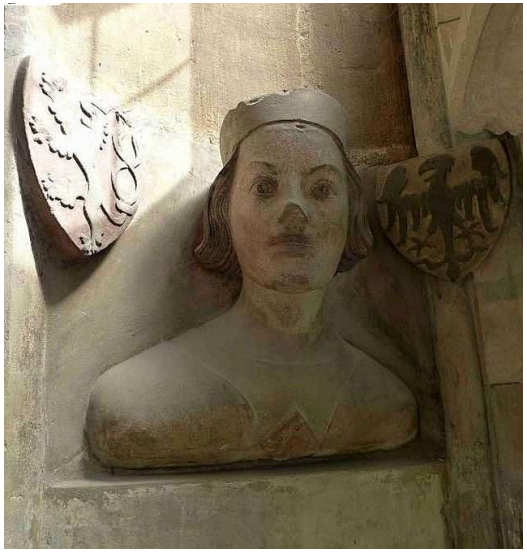
St. Vitus Cathedral at Prague Castle

St. Vitus Cathedral (constructed 1344 – 1929)

Triforium of St. Vitus Cathedral

Elizabeth of Bohemia and John the Blind

Triforium of St. Vitus Cathedral



Charles IV and his son Wenceslaus IV

University

University:

- four nations:
  [Bohemian, Bavarian, Polish and Saxon]
- first graduation 1359
- first college (Collegium Caroli) 1366
- four "faculties" (schools) – law, medicine, theology and Faculty of liberal arts]:
  trivium: grammar, logic, and rhetoric and
  quadrivium: arithmetic, geometry, music, and astronomy
- 1383 Karolinum given by Wenceslaus IV to the University

Prague Astronomical Clock

Old theory: the Clock created by Jan z Růže 1490

Discovery in 1962 (Z. Horský): it was created by clockmaker Mikuláš of Kadaň (born app. 1350) and

mathematician and astronomer, . . .
Jan Šindel
Iohannes Andreae dictus Schindel
Already in 1410 !

Šindel was later professor of Prague University and Rector just after Jan Hus (1410). Šindel was a priest and he gave his library (app. 200 books) to the University

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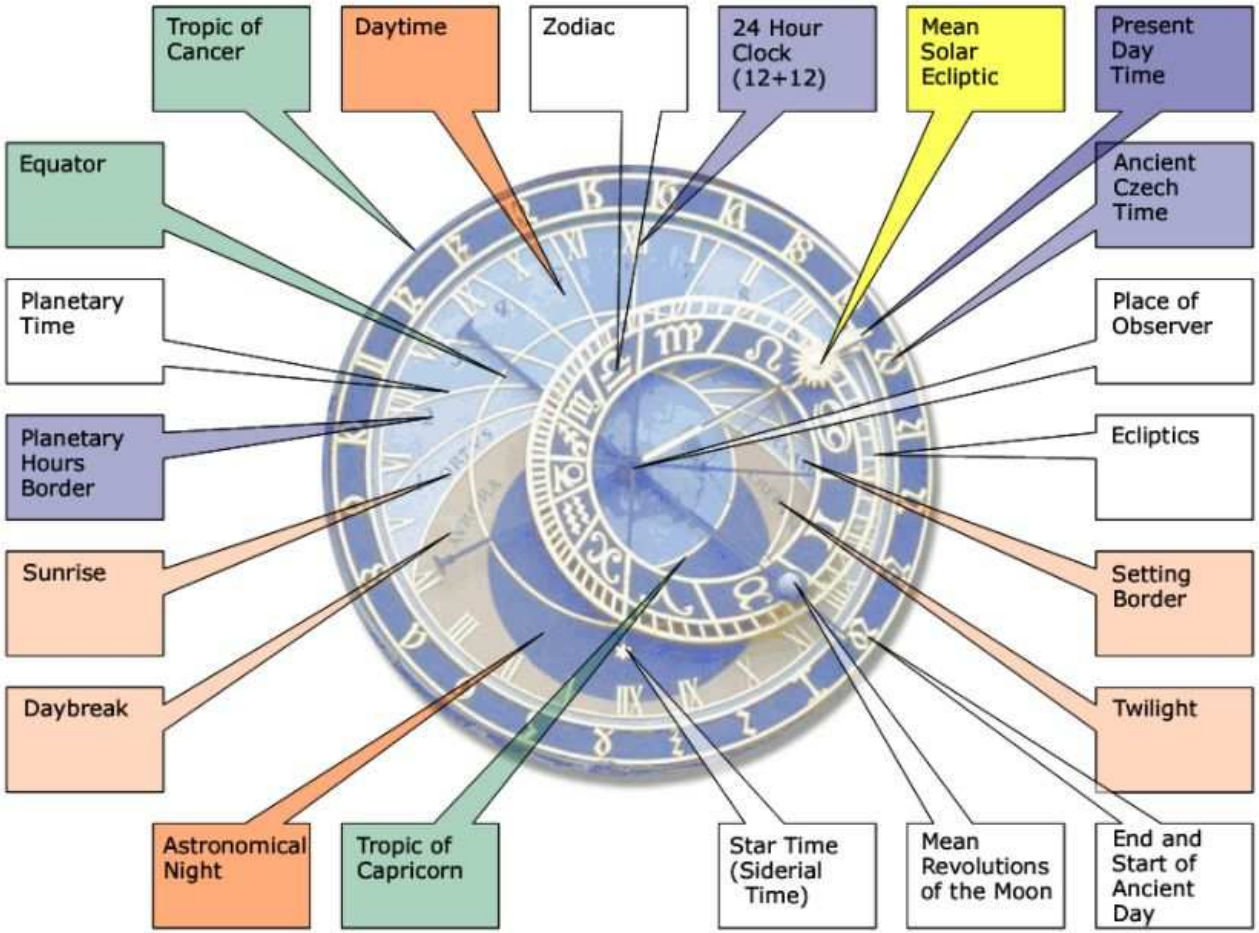
Prague Astronomical Clock

Is it complicated?



Prague Astronomical Clock

Example: { **1 2 3 4 3 2 1 2 3 4 3 2 . . .** }

1 2 3 4 3 2 1 2 3 4 3 2 1 2 3 4 3 2 1 2 3 4 3 2
1 2 3 4 3 2 1 2 3 4 3 2 1 2 3 4 3 2 1 2 3 4 3 2
1 2 3 4 3 2 1 2 3 4 3 2 1 2 3 4 3 2 1 2 3 4 3 2 . . .

1‖2‖3‖4‖3 2‖
1 2 3‖4 3‖2 1 2 3‖4 3 2‖1 2 3 4‖
3 2 1 2 3‖4 3 2 1 2‖3 4 3 2 1‖2 3 4 3 2‖1 2 3 4 3 2‖
1 2 3 4 3 2 1‖2 3 4 3 2 1 2‖3 4 3 2 1 2 3‖4 3 2 1 2 3 4‖
3 2 1 2 3 4 3 2‖1 2 3 4 3 2 1 2 3‖4 3 2 1 2 3 4 3‖
2 1 2 3 4 3 2 1 2 3‖4 3 2 1 2 3 4 3 2‖

Total number of bell strokes

$$1 + 2 + 3 + \cdots + 24 = 300 = 15 \times 20 \textbf{ (periodes)}$$

Prague Astronomical Clock

Example: { **1 2 3 4 3 2 1 . . .** }

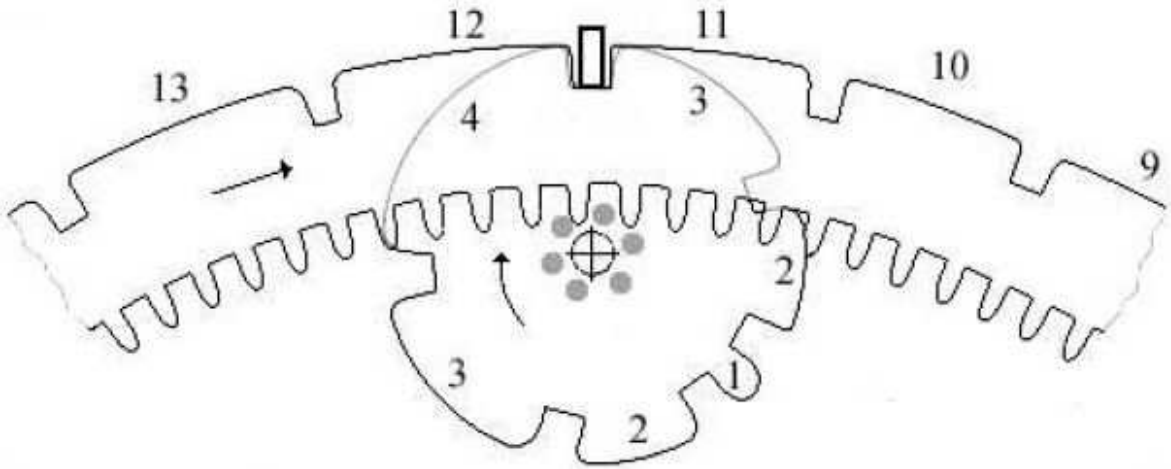


FIGURE 1. The number of bell strokes is denoted by the numbers . . . , 9, 10, 11, 12, 13, . . . along the large gear. The small gear placed behind it is divided by slots into segments of arc lengths 1, 2, 3, 4, 3, 2. The catch is indicated by a small rectangle on the top.

Source: an article by M. Křížek, A. Šolcová, L. Sommer: Construction of Šindel sequences or Horský: Prague Astronomical Clock (Czech, 1988)

Decree of Kutná Hora 1409

The Decree on the University (when Jan Hus was its Rector) brought substantial change (1409)

Czechs three votes : Foreigners single vote

Consequences:

- **emigration of foreign professors and students**
- **foundation of University of Leipzig in May 1409**
- **faculties of theology and law disappeared (faculty of liberal arts remained only)**
- **decline of Prague University (for about 200 years)**

Religious orders in Bohemia

Order of Saint Benedict (Benedictines)

- **St. George's Convent at Prague Castle (973)**
- **Benedictine Archabbey of St. Adalbert and St. Margaret (app. 1040)**

Order of Cistercians (Cistercians) (1142)

Order of Canons Regular of Prémontré (Premonstratensians) (1143)

...

Society of Jesus (Jesuits)

- Clementinum (1556, replaced Dominicans)

(Jan Šindel was a priest, astrolog, personal doctor of emperor, ...)

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Emperor Rudolf II (1552 – 1612)

Rudolf II –
Holy Roman Emperor (1576–1612)
and Czech King (1575 – 1611)

- **since 1583 resided with his court in Prague**
- **collector of art**
- **supported (occult) sciences, but**

it accelerated development of exact sciences

Prague Castle during Rudolf's reign

Prague Castle (Joris Hoefnagel 1595)
Source: Wikipedia

Tadeáš Hájek z Hájku (1525 – 1600)

Born in Bohemia

- from 1548 to 1549 studied medicine and astronomy (Vienna)
- 1552 received title Mgr
- 1554 Bologna (medicine) and
- Milano (lectures of G. Cardano)
- 1555 at the Univesity of Prague
- lectured on mathematics and astronomy
- private doctor of Rudolph II
- invited Tycho Brahe to Prague

Tycho Brahe (1546 – 1601)

Born in Denmark as
Tyge Ottesen Brahe in noble family

- a child prodigy, astronomer at 14
- studied in Copenhagen, Leipzig and Wittenberg
- 1573 published "De stella nova"
- 1576 – 1580 Uranienborg (Hven) supported by Frederic II
  support refused by Christian IV
- 1597 Brahe left Hven
- since 1599 in Benátky nad Jizerou, later in Prague

Tycho Brahe

Picture of the observatory on Hven

Source: Uraniborg Main Building from Blau's Atlas Major

Johann Kepler (1571 – 1630)

Born in Tübingen,
finished studies 1593

- **came to Prague as assistant of Tycho Brahe (†1601)**
- **Kepler obtained Brahe's documentation**
- **1st and 2nd Kepler law discovered in Prague app. 1607 and published in Astronomia Nova (1609)**
- **lived in Prague from 1600 to 1612**
- **1615 published work Nova Stereometria Doliorum Vinariorum**

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Tycho Brahe and Johann Kepler

Statue of Brahe and Kepler at Pohořelec

Tycho Brahe died in Kurz's house

1901

1930

Excavation of Brahe's house

Jost Bürgi (1552–1631)

Swiss clockmaker
worked on astronomical instruments

- **1604 came to Prague**
- **1609 worked with Kepler**
- **sometimes considered as inventor of (logarithmic) tables**

His grave in Kassel is not preserved,
but on the commemorative plate we can read:

. . . ingenious designer of measuring instruments and celestial globes, builder of the most precise clocks of the 16th century, inventor of the logarithms.

Source: Text from the commemorative plate on on the gravestone in Kassel

Jost Bürgi

Josef Stepling (1716 – 1778)

Born in Regensburg

- **moved to Prague, studied with Jesuits**
- **in 1733 entered the Jesuit order**
- **since 1748 in Prague**
- **in 1751 Observatory in Klementinum, its first director**
- **since 1753 director of Philosophical faculty of the University (chosen by Maria Theresia), reforms**
- **infinitesimal calculus, analytic geometry, astronomy**
- **important meteorologist, measurements in Klementinum from 1752, continuously from 1775**
- **author of many texts**

Josef Stepling

Stepling memorial in Klementinum (donated by Maria Theresia)

Josef Stepling

Stepling memorial in Klementinum (detail)

Stanislav Vydra (1741 – 1804)

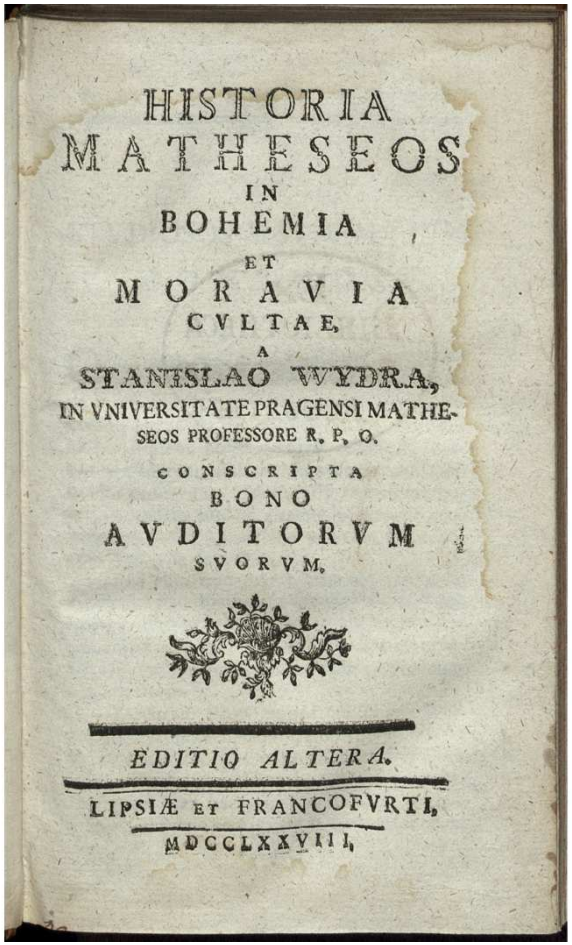
Professor of elementary mathematics at the University since 1772, Jesuit

- **Dean of Philosophical faculty in 1779 and 1789**
- **Rector of the University 1800**
- **in 1773 Jesuit order abolished, but**
- **Josef Stepling, Jan Tesánek and Stanislav Vydra remained on their positions**
- **good teacher, author of two books:**

Historia Matheseos in Bohemia et Moravia . . . (Praha, 1778)

Počátkové arytmetyky [Beginnings of Arithmetics] (published by J. L. Jandera, Praha, 1806)

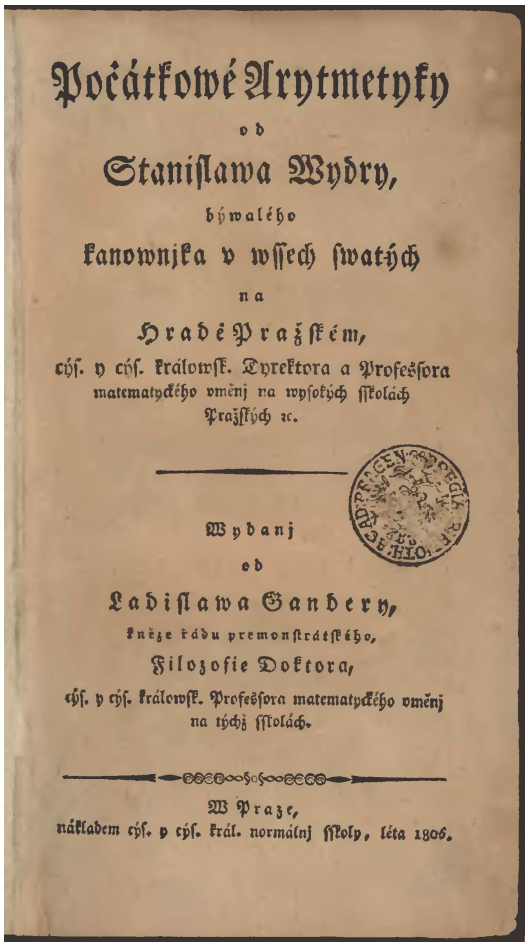
Stanislav Vydra



HISTORIA
MATHESEOS
IN
BOHEMIA
ET
MORAVIA
CVLTAE,
A
STANISLAO WYDRA,
IN VNIVERSITATE PRAGENSI MATHESEOS PROFESSORE R. P. O.
CONSCRIPTA
BONO
AVDITORVM
SVORVM.

EDITIO ALTERA.

LIPSIÆ ET FRANCOFVRTI,
MDCCLXXVIII.



Počátkowé Arytmetyky
od
Staniſlawa Wydry,
bywalého
kanownika v wſſech ſwatých
na
Hradě Pražſkém,
cýſ. y cýſ. králowſk. Dyrektora a Profeſſora
matematyckého vměnj na wyſokých ſſkolách
Pražſſkých ꝛc.

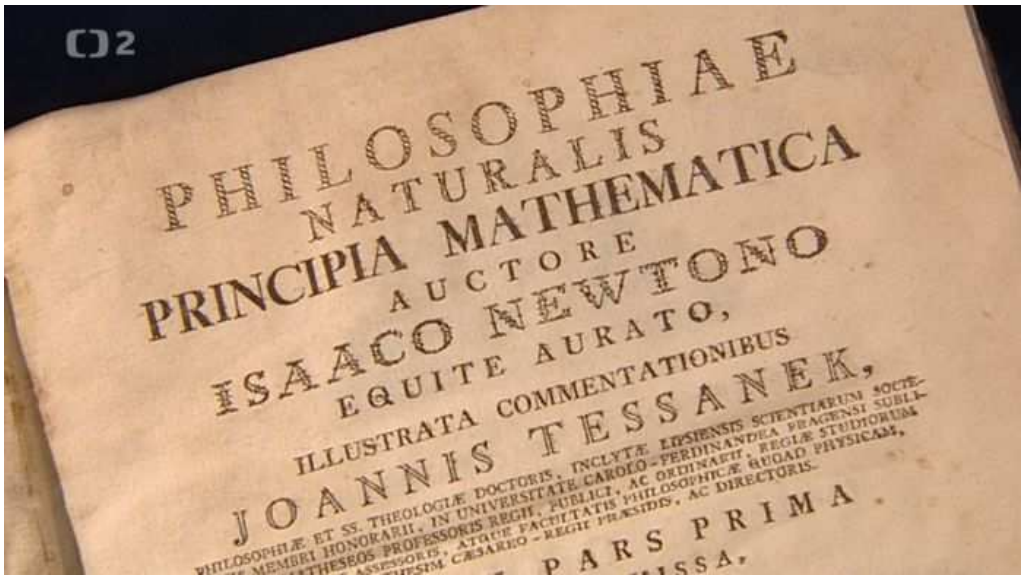
Wydanj
od
Ladiſlawa Sandery,
kněze řádu premonſtrátſkého,
Filozofie Doktora,
cýſ. y cýſ. králowſk. Profeſſora matematyckého vměnj
na týchž ſſkolách.

W Praze,
nákladem cýſ. y cýſ. král. normálnj ſſkoly, léta 1806.

Jan Tesánek (1728 – 1788)

Magni Newtoni Commentator as written on his headstone

- **1745 entered Jesuit order**
- **pupil of Stepling**
- **studies of philosophy and religion (priest)**
- **professor of physics, published some Newton's works with commentaries**



Jan Tesánek

- two years in Olomouc (his brother František wrote there textbook on physics)
- succesor of Stepling
  regular lectures on higher mathematics
- teacher of Gerstner, who was later his successor (Gerstner took care about old Tesánek)

František Josef Gerstner (1756 – 1783)

Maths was his favourite subject since elementary school

- **1765 – 1772 Jesuit gymnasium**
- **1772 – 1776 taught by Stepling, Tesánek and Vydra (Astronomy, Mathematics)**
- **Vienna – medicine, astronomy (Hell)**
- **1785 Royal Scientific Society**
- **1789 professor of mathematics at the University**

  excellent applied mathematician

František Josef Gerstner

He created conditions for education of technicians, at first in the frame of the University, later in an independent school (first in Austria).

- **1707 beginnings of technical education in Prague**
- **1794 École polytechnique founded in Paris (Gerstner member of the committee)**
- **in Prague lectured on higher analysis, astronomy, mechanics and hydraulics**

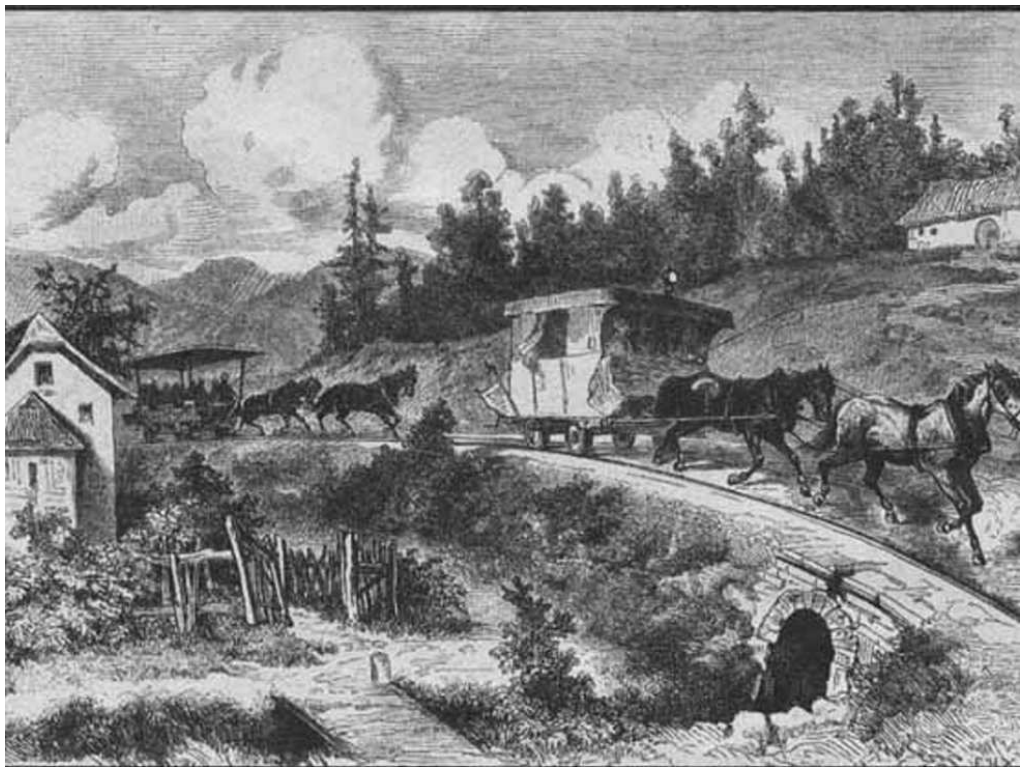
An interesting fact:
Gerstner was asked to connect Vltava river with Danube

- **His conclusions:**
  243 floodgates, too expansive, useless and unreliable

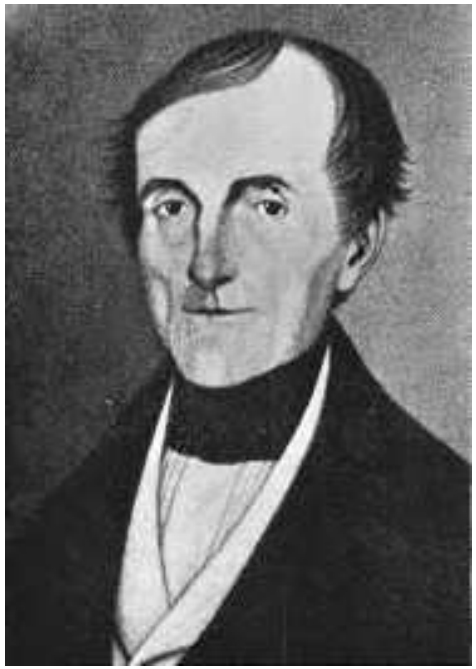
His solution: horse-drawn railway České Budějovice – Linz, partly realized by his son František Antonín

F. A. Gerstner built up its part:

- **České Budějovice – Kerschbaum (Rainbach)**
- **1825 – 1828 created (64 km)**
- **1832 – 1872 operated**



Jakob Philipp Kulik (1793 – 1863)

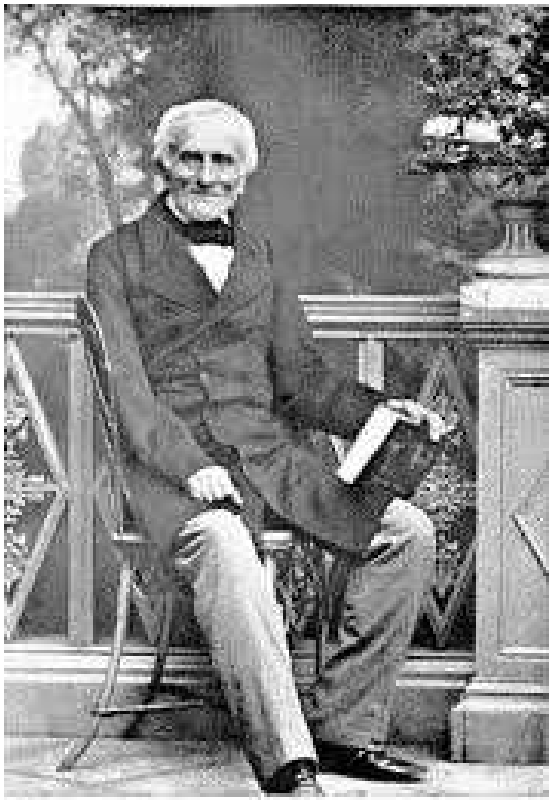


Born in Lviv (Ukraine), also known as Lwów, Lemberg, Lemberyk, ...

- studied philosophy, laws and mathematics in Lviv
- 1814 professor of elementary mathematics at Olomouc University
- 1816 professor of physics and applied mathematics at Graz University
- 1822 doctorate at Graz University
- 1826 professor of higher mathematics at Prague University until his death

Jakob Philipp Kulik

- published several textbooks
- also published
  numerous mathematical tables
- known for his factorization
  tables (4212 pages)
  unpublished, he did publish
  its description in 1860
- in 1848 Lviv University Library
  was destroyed
  Kulik donated 498 books in
  1000 volumes to the library



Profesor dr. Jakub Filip KULIK

Bernard Bolzano (1781 – 1848)

Bernard Bolzano

- **mathematician, logician, philosopher, priest**
- **Bolzano was of Italian/German origin**
- **spent his whole life in Bohemia**
- **attended lectures of S. Vydra and F.J. Gerstner**
- **studied mathematics and philosophy, switched for theology**
- **professor of theology of the University since 1806**
- **removed from the position in 1820**

Bernard Bolzano

- in 1804 he applied for another position (mathematics) but in vain (Josef Ladislav Jandera was chosen)
- supported by friends, small pension
- more time for scientific work

Mathematical works:

Analytischer Beweis des Lehrsatzes, daß zwischen je zwey Werthen, die ein entgegensetztes Resultat gewähren, wenigstens eine reelle Wurzel der Gleichung liege (1817)

Wissenschaftslehre, Band I – IV (1837)

Results

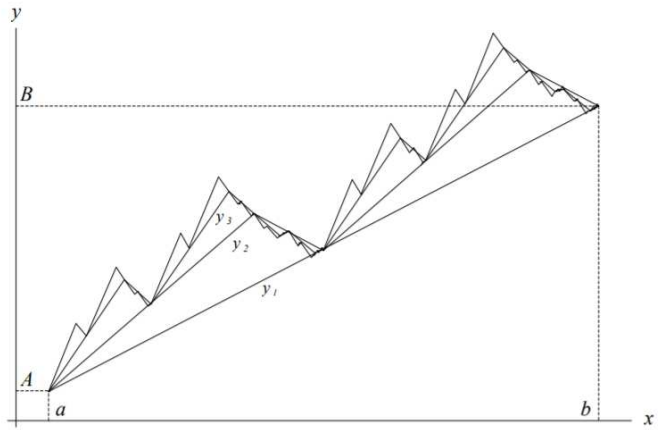
- **If $\limsup_{x \to c} |f(x)| = \infty$, f is not continuous at the point c.**
- **A function which is continuous in a closed interval $[a, b]$ is bounded on it.**
- **If f is continuous on $[a, b]$, $x_n \in [a, b]$, $f(x_n) \to c$, then f takes the value c in $[a, b]$.**
- **Each continuous function on $[a, b]$ assumes there greatest and smallest values.**
- **Each continuous function f on an interval J and $\alpha, \beta \in J$ has the property: if $f(\alpha) \neq f(\beta)$, then f takes all values between $f(\alpha)$ and $f(\beta)$. (1817)**

Source: an article of V. Jarník (slightly modified)

Other interesting facts

(a) Jašek's **discovery in Vienna archive:**

- **Bolzano described the first example of continuous nowhere differentiable function**
- **studied by G. Kowalewski, K. Rychlík, V. Jarník (they provided complete proofs)**
- **text was written between 1830 and 1834**

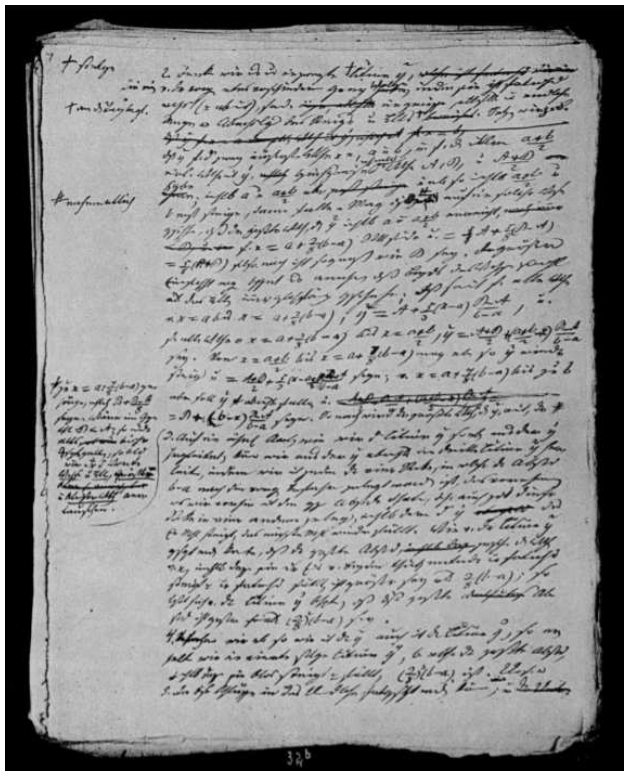


(Weierstrass' example 1872)

Other interesting facts

Jašek's photocopy of Bolzano's manuscript in Vienna archive:

donated in 1892 to the then existing
Court Library in Vienna by Bolzano's former disciple
Robert Zimmermann (1824 – 1898)



Other interesting facts

(b) L. A. Cauchy stayed between 1833 and 1836 in Prague Was he in contact with B. Bolzano?

B. Bolzano wrote in a letter to his pupil J. M. Fesl:

Mathematician Cauchy – as you might to know – was from 1834 to 1835 in Prague; he accompanied former French king Charles X and Lewis Antoine V.
During those several days which I spent there (in Easter time and in the fall) we had met several times . . .

(translated from German)

Union of Czech Mathematicians and Physicists

In 1862 four students of the University founded Society for Free Lectures in Mathematics and Physics renamed in 1869 to Union of Czech Mathematicians

Gabriel Blažek (1842 – 1910)
Josef Finger (1841 – 1925)
Josef Lošťák (1840 – 1909)
Josef Rudolf Vaňaus (1839 – 1910)

for about 2 years German language prevailed

it is 36th learned society in the world (all societies counted, not only specialized for mathematics)

Kulik supported the Society and donated many books to its library

Founders – portraits

Blažek

Lošťák

Finger

Vaňaus

Source: Jan Valenta, MFF UK

Fates of the founders

Gabriel Blažek

since 1871 professor of Prague Technical University, 3 times Rector (President), later Director of HypoBank

Josef Finger

4 years in Slovenia, then Austria, since 1884 professor of Polytechnics in Vienna, its Rector in 1890/91

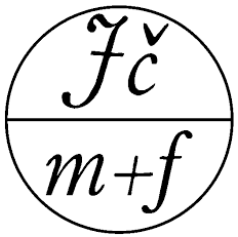
Josef Lošťák

since 1904 main inspector of teacher's institutes in Bohemia

Josef Rudolf Vaňaus

professor of the academic high school in Prague

Some activities of the Union



- **care on the level of teaching of mathematics and physics**
- **foundation of professional journal (Časopis pro pěstování mathematiky a fysiky) 1872 – first in Austro-Hungarian Empire, changed name several times and it still exists**
- **main publisher of textbooks, monographs, . . .**
- **owner of specialized library**
- **producer of educational equipment, owner of the house of Mathematical Institute**

. . .

Weyr family

František Weyr (1820 – 1889),
secondary school teacher of mathematics, and
Maria Rumpl (1825 – 1889)
had ten children, among them mathematicians
Emil and Eduard

Emil Weyr (1848 – 1894)
Eduard Weyr (1852 – 1903),

all children of Weyr family had a successfull career

Emil Weyr (1848 – 1894)

- studied at Prague Polytechnic (1865 – (O.W. Fiedler))
- since 1868 assistent of H. Durége
- in 1869 doctorate at University of Leipzig
- in 1870 Privatdozent at Prague University (E. Mach)
- stay in Milano, instead of Paris (F. Casorati, L. Cremona)
- in 1875 appointed as professor of mathematics (University of Vienna)

excellent member of Austrian geometical school
together with his brother Eduard

- 1873 married, 3 children, son František
- Emil died 1894 in Vienna

František Weyr (1879 – 1951)

František Weyr (son of Emil Weyr) was a professor of

Legal Philosophy and Public Law of Masaryk University (Brno)

- **one of the main authors of Czechoslovak Constitution persecuted by Communist regime (expelled from faculty by the action committee, † 1951)**

Eduard Weyr (1852 – 1903)

strongly influenced by his brother
published his first paper in 16

- **studied at the Polytechnics and at the University (Studnička)**
- **gained scholarship – Göttingen 1872**
- **1873 doctorate in Göttingen (On algebraic space curves)**
- **1874 habilitation, published 2 vol-book on projective geometry (with brother Emil) 3rd vol in 1878**

Interesting result: Variation on Jordan canonical form of a matrix

Strong tights to Czech origins felt in the whole Weyr's family, both brothers were active members of the Union

František Josef Studnička (1836 – 1903)

- 1857 – 1861 studied in Vienna
- doctorate, teaching qualification
- 1862 – 1864 high school in České Budějovice
- since 1864 Prague Polytechnics
- 1866 full professor
- 1871 Prague University as full professor
- 1872 University divided into two parts: Czech and German University
- 1872 1st Dean of Philosophical Faculty
- 1888/89 Rector of the University

Main mathematical work: Foundations of Higher Mathematics (3 vol., 1868 – 1871, self-published)

Mathias (Matyáš) Lerch (1860 – 1922)

- at the age of 6 injured, handicapped
- schooling since 9
- learned higher mathematics before his graduation
- studied at Czech Technical University since 1880 (Ed. Weyr, G. Blažek)
- extraordinary student of Prague University 1983/84
- Berlin in 1984/85 (K. Weierstrass, L. Kronecker, . . .)
- contacts with Hermite
- no position, went in 1896 to Freiburg (Hermite) for 10 years (110 papers)
- 1900 a surgery improved his handicap

Matyáš Lerch

- since 1906 professor at Czech Technical University in Brno
- honorary member of the Union
- since 1920 professor of Masaryk University
- 1922 died in Sušice (South Bohemia)
- almost 240 papers (in 6 languages) mainly from analysis, number theory, geometry, ...

A result

- **app. 150 works in analysis, mainly about series [some of them very special and mostly forgotten]**

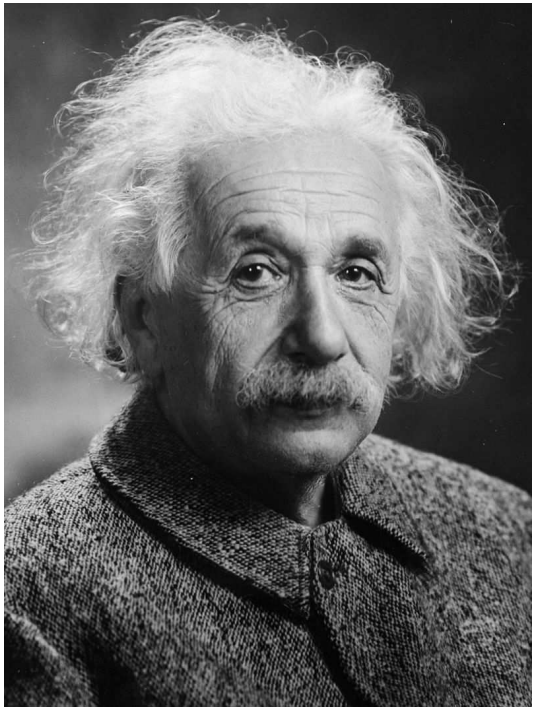
Example:

A construction of a function $f \in C^{(\infty)}(\mathbb{R})$ with radii of convergence of Taylor expansion at every point of $\mathbb{R}$ is equal 0

Albert Einstein (1879 – 1955)

Native German, born in Ulm

- at the age of 16 tried to enter ETH Zürich, in vain
- returned to school
- a year later (1916) accepted
- 1916 – 1920 studied at ETH



1896 – 1901 he was without any citizenship, author of

special theory of relativity
photoelectric effect
explanation of Brownian motion
mass-energy equivalence

(all these results published in one year (1905))

- 1911 – 1912 at Prague German University

Charles Loewner (1893 – 1968)

born as Karl Löwner in Lány

- **1917 Ph.D. at Prague (advisor Pick)**
- **1920 – 1922 assistent at German University**
- **1923 habilitation in Berlin**
- **1923 – 1928 assistent in Berlin**
- **1928 – 1930 extraordinary professor in Köln am Rhein**

1930 extraordinary professor of Prague German University
1934 professor of Prague German University
1939 emigration to U.S. (Louisville, Brown University, University of Syracuse, Stanford University)

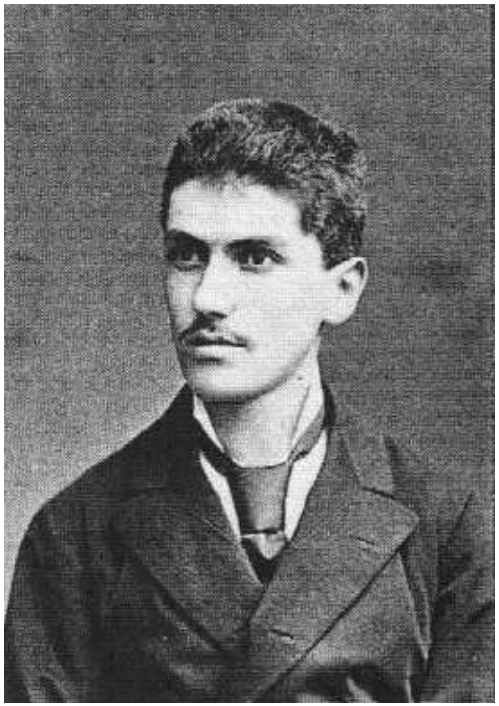
Löwner is known in connection with Bieberbach Conjecture: If f is a schlicht function (holomorphic in the unit circle, $U(0,1)$, $f(0)=0$, $f(1)=1$),

$$f(z) = z + \sum_{n=2}^{\infty} a_n z^n, \qquad z \in U(0,1)\,,$$

than $|a_n| \leq n$, $n = 0, 1, 2, \ldots$.

Partial results had been proven by Bieberbach (1916), Löwner (1923), ... (up to $n = 6$), the general case by Louis de Branges (1985).

Georg Alexander Pick (1859 – 1942)



Studied mathematics and physics in Vienna 1875 – 1879

- **1880 doctorate (Vienna)**
- **position in Prague (Mach)**
- **1882 habilitation**
- **1888 extraordinary professor**
- **1892 professor**
- **a year in Leipzig (F. Klein)**
- **1900/1901 Dean, . . .**
- **1929 retired, Vienna**

- **1938 back in Prague due to Anschluß of Austria**
- **1942 murdered in Theresienstadt**

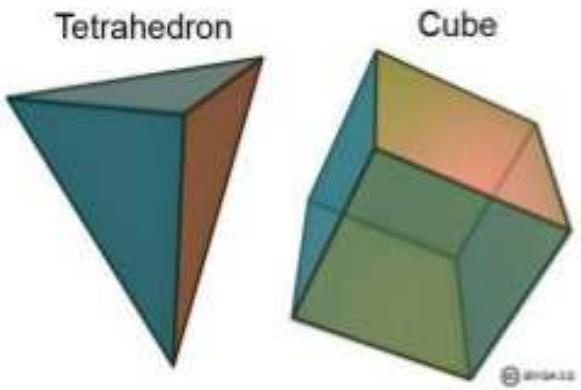
L. Euler in a letter to Christian Goldbach in 1750 described the following:

- **Euler's Formula**
- **For any polyhedron *that doesn't intersect itself*, the**
- **Number of Faces**
- plus the **Number of Vertices** (corner points)
- minus the **Number of Edges**
- **always equals 2**
- This can be written: $\mathbf{F + V - E = 2}$

Try it on the cube:

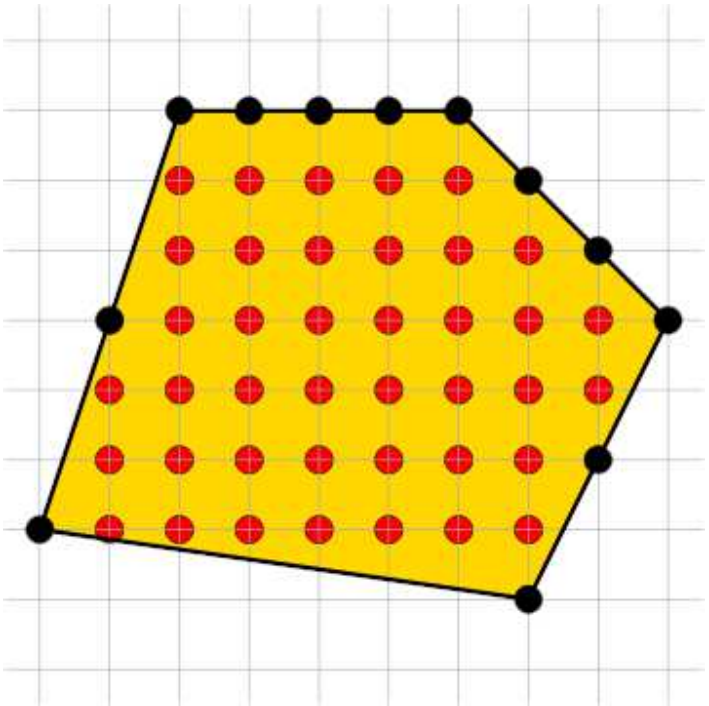
A cube has 6 Faces, 8 Vertices, and 12 Edges,

so: $6 + 8 - 12 = 2$



Source: Yousef Elshrek, University of Tripoli

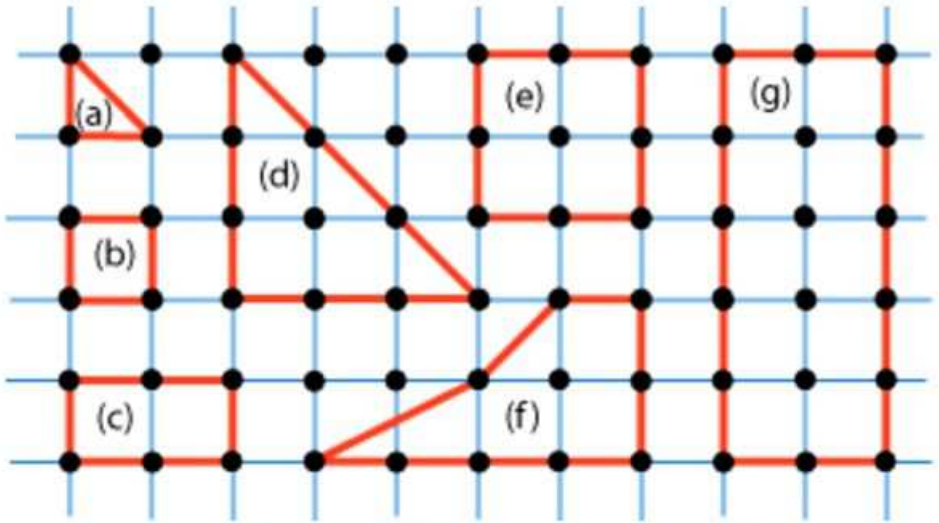
Pick's Theorem - The Elegant, Universal, and Surprisingly Simple Method to Finding Area!



$$\text{Area} = \text{Interior pt} + \frac{\text{Boundary pt}}{2} - 1$$

Source: Georg Ross' Utility Closet (Pål)

$$\textbf{Area} = \textbf{Interior pt} + \frac{\textbf{Boundary pt}}{2} - 1$$



a) $Area = 0 + \frac{3}{2} - 1 = \boxed{0.5}$

b) $Area = 0 + \frac{4}{2} - 1 = \boxed{1}$

c) $Area = 0 + \frac{6}{2} - 1 = \boxed{2}$

d) $Area = 1 + \frac{9}{2} - 1 = \boxed{4.5}$

e) $Area = 1 + \frac{8}{2} - 1 = \boxed{4}$

f) $Area = 1 + \frac{9}{2} - 1 = \boxed{4.5}$

g) $Area = 4 + \frac{14}{2} - 1 = \boxed{10}$

Source: Terry Wilkinson's Steemit, South Korea

G. A. Pick and A. Einstein

It is highly probable that the use of Riemannian geometry in the relativity theory was the result of Einstein's discussions with Pick. Later Einstein claimed that he got this idea in 1912, after his stay in Prague.

Viničná 7 (where Einstein had his office)

Czechs working abroad

The case of Lerch was not unique.
Lack of positions at home led Czechs abroad.
Czech scientists worked e.g. in
Russia, Bulgaria, Croatia

Nikolai Dmitrievich Brashman (1796 – 1866)

Born in Rousínov (Neuraussnitz)

- 1815 – 1821 studied in Vienna (influenced by K. L. Littrow) Lwów, St. Petersburg, Kazan´
- since 1834 in Moscow
- 1859 full professor of MGU
- cofounder of MMO (Moscow Mathematical Society) in 1864 and
- Matematicheskii Sbornik (Russian Mathematical Surveys] (1866)

Bulgaria

Bulgaria:

- very long history,
- for centuries politically unstable territory
- in app. 1400 – app. 1880 under Ottoman Turks
- school system built relatively late
- Czechs helped a lot

Theodor Monin (1858 – 1893)

Born in Kolín, secondary school in Kutná Hora

- **1874 – 1878 studied in Prague Polytechnics**
- **1879 habilitated**
- **1880 qualified for teaching**
- **1881 – 1886 Sliven (Bulgaria), then back to Prague Polytechnics**
- **1888 (1904) Sofia University founded**
- **1889 called to Sofia, the first professor of mathematics**
- **1891 returned back (illness)**
- **1893 died (35)**
- **1887 – 1889 7 small contributions in Czech journals**

Vladislav Šak (1860 – 1941)

There were more such mathematicians in Bulgaria, one of them
Vladislav Šak (1860 – 1941)

The most important was Šourek
He had a key role in the development of mathematics in Bulgaria

Source: Martina Bečvářová: České kořeny bulharské matemtiky

Antonín Václav Šourek (1857 – 1926)

Born in Písek

- **1876 finished secondary school**
- **1876 – 1878 Polytechnics in Vienna and**
- **1876 – 1878 Prague University**
- **1878 – 1880 studied in Prague**
- **1880 – 1890 Sliven, Plovdiv, Sofia**
- **Šourek wrote and translated many textbooks, also for secondary schools**

Karel Zahradník (1848 – 1916)

Born in Litomyšl

- **1868 finished secondary school**
- **1868 – 1874 Prague Polytechnics and Prague University**
- **1874 doctorate in philosophy and teacher's qualification**
- **1872 – 1876 asistent at Polytechnics and secondary school teacher**

  since 1868 in Society for Free Lectures . . . ; active member
- **1876 full professor at Royal Croatian University (23 y.)**
- **1899 the first Rector of Polytechnics in Brno**

Karel Zahradník

Zahradník published 7 didactical works and 83 articles, but they are sometimes overlapping or in different languages (Lerch).
They are mostly devoted to study of various plane curves

Zagreb where Zahradník spent one third of his life

Václav Hlavatý (1894 – 1969)

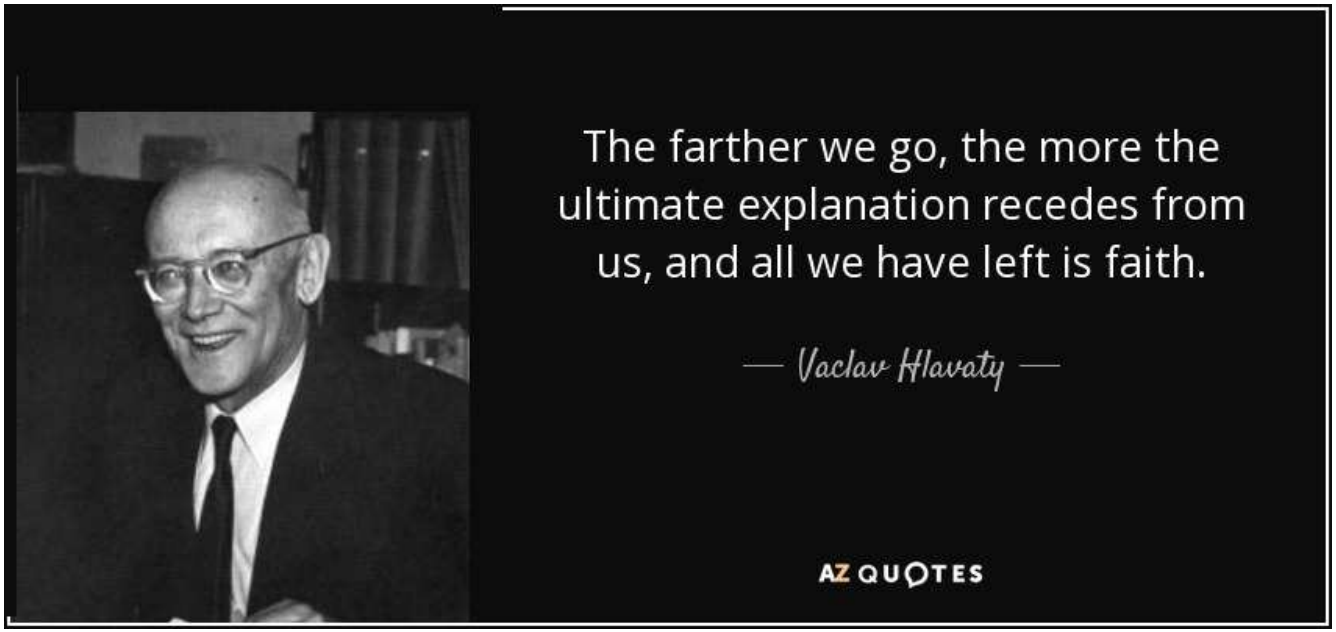
born in Louny

- **studied mathematics since 1913 (together with music)**
- **teaching at secondary schools**
- **1925 docent of the University**
- **1931 professor of the University**
- **1937 – 1938 IAS Princeton (Einstein)**

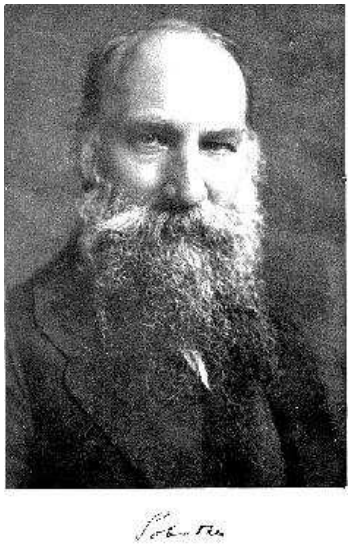
1945 fighted at barricades in Prague
member of the Parliament
1948 invited to the U.S. (Bloomington), left with family
1952 permanent position at Bloomington

Václav Hlavatý

cooperation with A. Einstein
founder of the Czechoslovak Society of Arts & Sciences



Jan Sobotka (1862 – 1931)



basic education in German (Prague)

- 1886 – 1886 studied at the University
- asistent of Tilšer at Prague Polytechnics
- Wroclaw, Vienna
- 1897 extraordinary professor of Polytechnics for geometry and graphical calculus
- 1899 professor of descriptive geometry in Brno
- 1904 professor of mathematics of Prague University until his death in 1931
- 1885 first publication
- fields: elementary, projective, kinematic and differential geometry, author of 3 monographs

Karel Petr (1868 – 1950)

In 1903: Studnička and E. Weyr died and so the University had no professor of mathematics

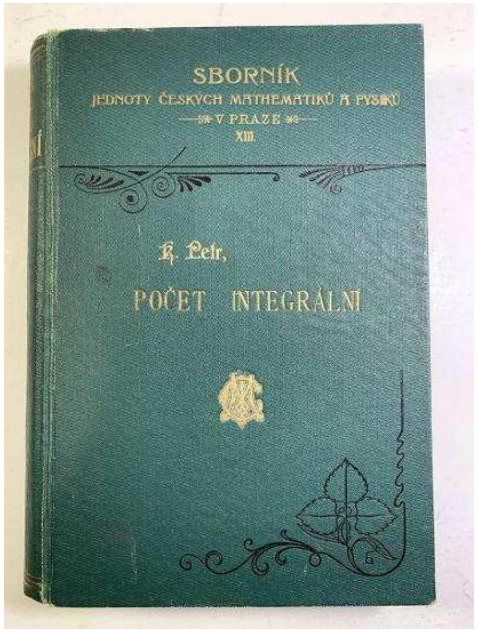
K. Petr studied at the University, ten years taught at secondary schools

- **1896 married, new impulse for career**
- **1903 habilitation at the Brno Polytechnic was transferred to Prague University**
- **1903 extraordinary professor**
- **1908 professor (inaugural lecture on B. Bolzano)**
- **specialized on number theory (22 works)**
- **interested in numerical mathematics**
- **outstanding teacher, raised the level of education of secondary school teachers**

Karel Petr

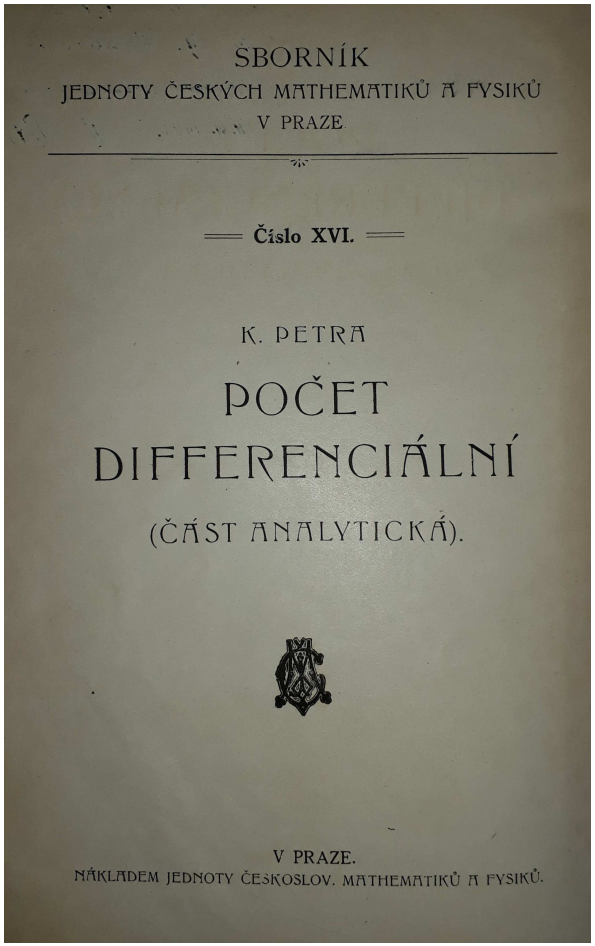
Works:

- started to publish at secondary school
- altogether 108 works from algebra and number theory (quadratic forms)
- also analysis and geometry
- 3 voluminous textbooks:
  On differential equations (1911)
  Differential calculus (1923)
  Integral calculus (1915, 1931)



it contains also: Introduction to Set Theory (V. Jarník)

Karel Petr


SBORNÍK
JEDNOTY ČESKÝCH MATHEMATIKŮ A FYSIKŮ
V PRAZE

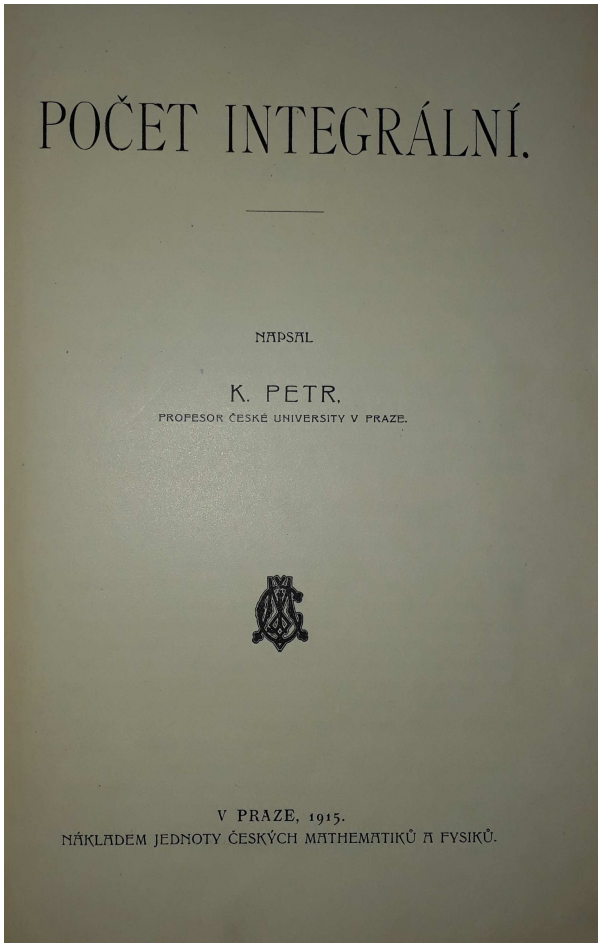
Číslo XVI.

K. PETRA

POČET
DIFFERENCIÁLNÍ

(ČÁST ANALYTICKÁ).

V PRAZE.
NÁKLADEM JEDNOTY ČESKOSLOV. MATHEMATIKŮ A FYSIKŮ.


POČET INTEGRÁLNÍ.

NAPSAL

K. PETR,
PROFESOR ČESKÉ UNIVERSITY V PRAZE.

V PRAZE, 1915.
NÁKLADEM JEDNOTY ČESKÝCH MATHEMATIKŮ A FYSIKŮ.

When Prof. K. Petr received honorary doctorate of Masaryk University (Brno, 1938) E. Čech said:

Excellent teaching activities of Prof. Petr are based on the fact that he made always his teaching tasks difficult as much as possible. He never forgot that he dealt with no experienced mathematicians but beginners and that he has only at that time to cultivate their love to mathematics. He never helped himself at the case of difficult things by half-truth or cheep references on literature but always patiently sought so long until he found distinctive, right and accessible method of explanation.

Eduard Čech (1893 – 1960)

Secondary education in Hradec Králové

- **studied at the University since 1912**
  doctorate 1920 (advisor K. Petr)
  1921 – 1922 with Guido Fubini
- **1923 extraordinary professor**
  of Masaryk University
- **1928 full professor of analysis**
- **interest in topology,**
  1st work in 1930

Eduard Čech

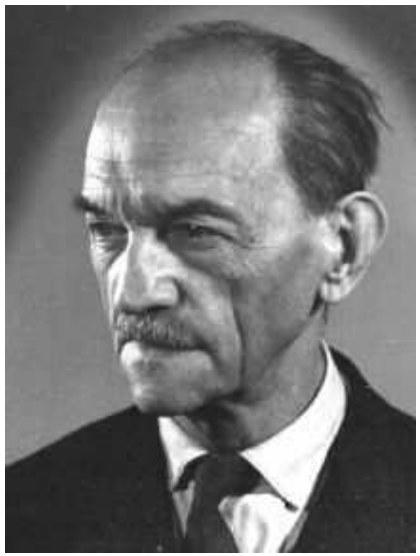
- **Stone – Čech compactification, Čech cohomology, . . .**
- **1935 Moscow 2nd topological confererence**
- **1936 Institute for Advanced Studies (Princeton), invited by S. Lefschetz**
- **1947 BUM (Badatelský ústav matematický) [Mathematical Research Institute, predecessor of the Institute of Mathematics of Czech Academy of Sciences]**

Vojtěch Jarník (1897 – 1970)

son of
Jan Urban Jarník (1848 – 1923),
professor of the University and
colleague of T. G. Masaryk
(1st President of Czechoslovakia)

- 1915 – 1920 studied mathematics and physics
- 1919 – 1921 assistent of J. Vojtěch (in Brno)
- since 1921 in Prague (assistent of K. Petr)
- app. 3 years in Göttingen (E. Landau)

Vojtěch Jarník



- 1935 professor of the University
- analysis, number theory
  (lattice points in ellipsoids)
- interested in the history (Bolzano)
- excellent lecturer and teacher
- author of voluminous textbook
  on differential and integral calculus
  (4 volumes, written partly during WW II)

In 1930 published "O jistém problému minimálním" [About a certain minimal problem]
It led to so called Prim–Jarník algorithm (graph theory)

Vojtěch Jarník

The last edition of his textbooks has more than 2300 pages

Otakar Borůvka (1914 – 1996)

Started his education in military schools (Hranice, Mödling)

- **1918 finished secondary school**
- **Brno, Technical University and Masaryk University**
- **1921 assistent of Lerch**
- **1923 doctorate (supervisor E. Čech)**
- **1926 – 1929 Paris (with Élie Cartan)**
- **1928 habilitation**
- **1930 – 1931 Hamburg (with Wilhelm Blaschke)**

Otakar Borůvka

- 1934 assistent professor at Masaryk University
- 1946 professor

Several changes of problematics:

- 1923 – 1925 classical analysis
- 1926 On a certain minimal problem
- 1924 – 1935 differential geometry
- later abstract algebra (group theory)
- after WW II differential equations

Mostly known in connection with so called
Minimum Spanning Tree Problem
(shortly MST, Borůvka formulation):

Otakar Borůvka

MST : There are n points given in the plane (in the space) whose mutual distances are different. The problem is to join them through the net in such a way that:

1. **any two points are joined to each other either directly or by means of some other points,**
2. **the total length of the net would be the smallest**

Source: Article by J. Nešetřil, E. Milková, H. Nešetřilová: Otakar Borůvka on minimum spanning tree problem in Discrete Mathematics (2001)

Otakar Borůvka

concerning MST : The problem was posed to Borůvka by Jindřich Saxel from electric network company.

Details on the whole development (to different algorithms contributed e.g. K. Čulík, G. Dantzig, E.W. Dijkstra, A. Kotzig, J.B. Kruskal, H.W. Kuhn, H. Loberman, A. Weinberger, R. Kalaba, R.C. Prim, E.W. Solomon (also above mentioned Jarník)

Quote from Nešetřil: One can even say that out of many available MST-algorithms Borůvka's algorithm is presently the basis of the fastest known algorithms.

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REMARK:

The collected work of several eminent Czech mathematicians can be found in the

Czech Digital Mathematics Library

https://dml.cz/