HOVEDPUNKTER OM NEWTON

f. 25/12 1642 i WOOLSTHORPE

1661 TIL CAMBRIDGE

1663 BARROW PROFESSOR V. CAMBRIDGE

'65-66 PEST, CAMBRIDGE LUKKER

1669 NEWTON PROFESSOR

1687 PRINCIPIA UDGIVES

1696 WARDEN VED "MINT"
99 MASTER —"—

1703 FORMAND FOR ROYAL SOCIETY

1727 DØD

NEWTON - UDVALGTE PUBLIKATIONER

1672 PUBLICATION OM LYS OG FARVER

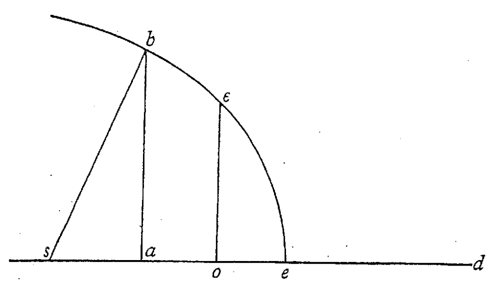
THE OCTOBER 1666 TRACTAT

1687 PRINCIPIA

1711 'OM ANALYSEN VED LIGNINGER, UENDELIGE I ANTALLET AF LED'
(SKREVET 1669)

1737 'METODEN OM FLUXIONER OG UENDELIGE RÆKKER'
(SKREVET 1671)

NEWTON OM DESCARTES SUBNORMAL OG HUDDES ALGORITME:



[1] $\left[y=a\sqrt{\frac{a+x}{x}}.\right]$

Let $ed=a$. $ae=x$. $ab=y$. $se=v$.

$sb=s$. $ss=y^2+vv+xx-2vx$.

$aax+a^3=yyx$. $y^2=ss-vv+2vx-xx$.

$aax+a^3=ssx-vvx+2vx^2-x^3$.

$$x^3-2vx^2+vvx+a^3=0.$$
$$\quad -ss$$
$$\quad +aa$$

$\cdot 2 \quad 1 \quad 0 \quad -1$

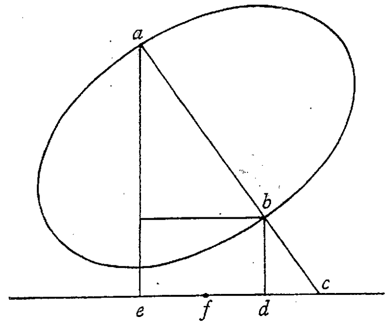
$$2x^3 \quad -2vx^2 \quad * \quad -a^3=0. \quad \frac{2x^3-a^3}{2xx}=v.^{(2)}$$

GENERALISERING AF "METODE:

[September 1664]

Haveing yᵉ nature of a crooked line expressd in Algebr: termes to find its axes, to determin it & describe it geometrically &c.

If $fd=x$. $db=y$. & y being perpendicular to x describes yᵉ crooked line wᵗʰ one of its extreames. Then reduce yᵉ equation (expressing yᵉ nature of yᵉ line) to one side soe yᵗ it be $=0$. Then find yᵉ perpendicular bc wᶜʰ is done by finding $dc=v$. for $vv+yy=bc^2$.



(In finding $dc=v$ observe this rule. Multiply each terme of yᵉ equat: by so many units as x hath dimensions in yᵗ terme, divide it by x & multiply it by y for a Numerator. Againe multiply each terme of yᵉ equation by soe ☞ many units as y hath dimensions in each terme & divide it by $-y$ for a denom: in yᵉ valor of v.(2)

EKSEMPEL PÅ AT FINDE v VED HJÆLP AF ANGIVNE METODE:

Example, [1st.] $-rx+\frac{rxx}{q}+yy=0.$

$$\frac{-1rx+2\frac{rxx}{q}+0yy \text{ in } y}{x}=-ry+\frac{2rxy}{q}. \quad \frac{-0rx+0\frac{rxx}{q}+2yy}{-y}=-2y. \text{ therefore}$$

$$\frac{-ry+\frac{2rxy}{q}}{-2y}=v=+\frac{1}{2}r-\frac{rx}{q}.$$

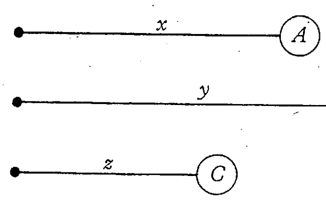
TABELLER OVER STAMFUNKTIONER

The squareing of those lines whose area is exprest by affirmative quantitys in wch ye unknowne quantity is numeratr. (53)

The equations expressing the nature of ye lines.		Theire square.
$3xx=ay.$ Parab:	————————	$\frac{x^3}{a}.$
$4x^3=aay.$	————————	$\frac{x^4}{aa}.$
$5x^4=ya^3.$	————————	$\frac{x^5}{a^3}.$
$6x^5=ya^4.$	————————	$\frac{x^6}{a^4}.$
$7x^6=ya^5.$	————————	$\frac{x^7}{a^5}.$

UDDRAG AF OKTOBER 1666 TRAKTAT

7 Haveing an Equation expressing y^e^ relation twixt two or more lines x, y, z &c: described in y^e^ same time by two or more moveing bodys A, B, C, &c: the relation of their velocitys p, q, r, &c may bee thus found, viz:

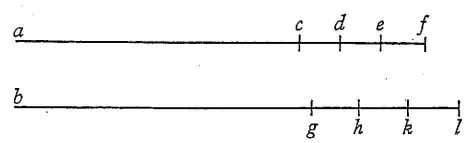


Set all y^e^ termes on one side of y^e^ Equation that they become equall to nothing. And first multiply each terme by so many times $\frac{p}{x}$ as x hath dimensions in y^t^ terme. Secondly multiply each terme by so many times $\frac{q}{y}$ as y hath dimensions in it. Thirdly (if there be 3 unknowne quantitys) multiply each terme by so many times $\frac{r}{z}$ as z hath dimensions in y^t^ terme, (& if there bee still more unknowne quantitys doe like to every unknowne quantity). The summe of all these products shall bee equall to nothing. w^ch^ Equation gives y^e^ relation of y^e^ velocitys p, q, r, &c.

BEVIS FOR PROP. 7:

Prop 7 Demonstrated.(45)

Lemma. If two bodys A, B, move uniformely y^e^ $\begin{matrix}\text{one}\\ \text{other}\end{matrix}$ from $\begin{matrix}a\\ b\end{matrix}$ to $\begin{matrix}c, d, e, f,\\ g, h, k, l,\end{matrix}$ &c: in y^e^ same time. Then are y^e^ lines $\frac{ac,}{bg,}$ & $\frac{cd,}{gh,}$ & $\frac{de,}{hk,}$ & $\frac{ef,}{kl,}$ &c: as their velocitys $\frac{p}{q}$. And though they move not uniformely yet are y^e^ infinitely little lines w^ch^ each moment they describe, as their velocitys w^ch^ they have while they describe y^m^. As if y^e^ body A w^th^ y^e^ velocity p describe y^e^ infinitely little line $(cd=)p\times o$ in one moment, in y^t^ moment y^e^ body B w^th^ y^e^ velocity q will describe y^e^ line $(gh=)q\times o$. For $p:q::po:qo$. Soe y^t^ if y^e^ described lines bee $(ac=)x$, & $(bg=)y$, in one moment, they will bee $(ad=)x+po$, & $(bh=)y+qo$ in y^e^ next.



Demonstr: Now if y^e^ equation expressing y^e^ relation twixt y^e^ lines x & y bee $x^3-abx+a^3-dyy=0$. I may substitute $x+po$ & $y+qo$ into y^e^ place of x & y; because (by y^e^ lemma) they as well as x & y, doe signify y^e^ lines described by y^e^ bodys A & B. By doeing so there results

$$\begin{array}{l} x^3+3poxx+3ppoox+p^3o^3-dyy-2dqoy-dqqoo=0.\\ \qquad\;\; -abx \quad\;\; -abpo \\ \qquad\qquad\quad\;\; +a^3 \end{array}$$

But $x^3-abx+a^3-dyy=0$ (by supp). Therefore there remaines onely

$$\begin{array}{l} 3poxx+3ppoox+p^3o^3-2dqoy-dqqoo=0.\\ \qquad\qquad -abpo \end{array}$$

Or dividing it by o tis $\begin{array}{l}3px^2+3ppox+p^3oo-2dqy-dqqo=0.\\ \qquad\qquad -abp\end{array}$ Also those termes are infinitely little in w^ch^ o is.(46) Therefore omitting them there rests

$$3pxx-abp-2dqy=0.$$

HOVEDPUNKTER OM LEIBNIZ

F. 1. juni 1646 i LEIPZIG

1661 INDSKREVET PÅ UNIVERSITET I LEIPZIG

1667 DOKTOR DISPUTATS V. ALTDORF

BLEV SOM DIPLOMAT SENDT TIL PARIS: KONTAKT TIL BLA. HUYGENS

DRIVKRAFT:

- LOGISK UNIVERSALSPROG' CHARACTERISTICA GENERALIS

VEJE TIL INFINITESIMALREGNING

- ARBEJDE M. (UENDELIGE) RÆKKER.
- GEOMETRISKE ARBEJDER: TANGENT OG AREALBESTEMMELSER.

FRA CHILD: The Early Mathematical Manuscripts of Leibniz, 1920. (s. 50)

Harmonic Triangle

in which the fundamental series is a harmonical progression;

$$
\begin{array}{ccccccccccccc}
 & & & & & & \frac{1}{1} & & & & & & \\
 & & & & & \frac{1}{2} & & \frac{1}{2} & & & & & \\
 & & & & \frac{1}{3} & & \frac{1}{6} & & \frac{1}{3} & & & & \\
 & & & \frac{1}{4} & & \frac{1}{12} & & \frac{1}{12} & & \frac{1}{4} & & & \\
 & & \frac{1}{5} & & \frac{1}{20} & & \frac{1}{30} & & \frac{1}{20} & & \frac{1}{5} & & \\
 & \frac{1}{6} & & \frac{1}{30} & & \frac{1}{60} & & \frac{1}{60} & & \frac{1}{30} & & \frac{1}{6} & \\
\frac{1}{7} & & \frac{1}{42} & & \frac{1}{105} & & \frac{1}{140} & & \frac{1}{105} & & \frac{1}{42} & & \frac{1}{7}
\end{array}
$$

where, if the denominators of any series descending obliquely to infinity or of any parallel finite series, are each divided by the term that corresponds in the first series, the combinatory numbers are produced, namely those that are contained in the arithmetical triangle. Moreover this property is common to either triangle, namely, that the oblique series are the sum- and difference-series of one another. In the Arithmetical Triangle any given series is the sum-series of the series that immediately precedes it, and the difference-series of the one that follows it; in the Harmonic Triangle, on the other hand, each series is the sum-series of the series following it, and the difference-series of the series that precedes it. From which it follows that

$$\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\frac{1}{7}+\text{ etc.} = \frac{1}{0}$$

$$\frac{1}{1}+\frac{1}{3}+\frac{1}{6}+\frac{1}{10}+\frac{1}{15}+\frac{1}{21}+\frac{1}{28}+\text{ etc.} = \frac{2}{1}$$

$$\frac{1}{1}+\frac{1}{4}+\frac{1}{10}+\frac{1}{20}+\frac{1}{35}+\frac{1}{56}+\frac{1}{84}+\text{ etc.} = \frac{3}{2}$$

$$\frac{1}{1}+\frac{1}{5}+\frac{1}{15}+\frac{1}{35}+\frac{1}{70}+\frac{1}{126}+\frac{1}{210}+\text{ etc.} = \frac{4}{3}$$

and so on.

(FRA FAUVEL & GRAY: HISTORY OF MATHEMATICS)

13.A1 A notation for the calculus

To resume, $\frac{l}{a} = \frac{p}{\text{omn.}\, l} = y$, therefore $p = \frac{\overline{\text{omn.}\, l}}{a} l$. Hence, omn. $y\frac{l}{a}$ does not mean the same thing as omn. y into omn. l, nor yet y into omn. l; for, since $p = \frac{y}{a} l$ or $\frac{\overline{\text{omn.}\, l}}{a} l$, it means the same thing as omn. l multiplied by that one l that corresponds with a certain p; hence, omn. $p = \text{omn.} \frac{\overline{\text{omn.}\, l}}{a} l$. Now I have otherwise proved omn. $p = \frac{y^2}{2}$, i.e., $= \frac{\overline{\text{omn.}\, l}^2}{2}$; therefore we have a theorem that to me seems admirable, and one that will be of great service to this new calculus, namely, $\frac{\overline{\text{omn.}\, l}^2}{2} = \text{omn.}\, \overline{\overline{\text{omn.}\, l}\frac{l}{a}}$, whatever l may be; that is, if all the ls are multiplied by their last, and so on as often as it can be done, the sum of all these products will be equal to half the sum of the squares, of which the sides are the sum of the ls or all the ls. This is a very fine theorem, and one that is not at all obvious.

Another theorem of the same kind is: omn. $xl = x$ omn. l − omn. omn. l, where l is taken to be a term of a progression, and x is the number which expresses the position or order of the l corresponding to it; or x is the ordinal number and l is the ordered thing.

N.B. In these calculations a law governing things of the same kind can be noted; for, if omn. is prefixed to a number or ratio, or to something indefinitely small, then a line is produced, also if to a line, then a surface, or if to a surface, then a solid; and so on to infinity for higher dimensions.

It will be useful to write $\int$ for omn., so that $\int l = \text{omn.}\, l$, or the sum of the ls. Thus, $\frac{\int \bar{l}^2}{2} = \int \overline{\int \bar{l} \frac{l}{a}}$, and $\int \overline{xl} = x \int \bar{l} - \int\int l$.

From this it will appear that a law of things of the same kind should always be noted, as it is useful in obviating errors of calculation.

Now note that if the terms are affected, the sum is also affected in the same way, such being a general rule; for example, $\int \overline{\frac{a}{b} l} = \frac{a}{b} \times \int \bar{l}$, that is to say, if $\frac{a}{b}$ is a constant term, it is to be multiplied by the maximum ordinal; but if it is not a constant term, then it is impossible to deal with it, unless it can be reduced to terms in l, or whenever it can be reduced to a common quantity, such as an ordinal. [...]

I propose to return to former considerations.

Given l, and its relation to x, to find $\int l$.