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**Analysis aequationum universalis seu ad aequationes algebraicas
resolvendas methodus generalis, & expedita, ex nova infinitarum
serierum methodo, deducta ac demonstrata**

Raphson, Joseph

Londini, 1697

ETH-Bibliothek Zürich

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Canones directorii theorematis confidendis inservientes.

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CANONES DIRECTORII

Theorematis Conficiendis inservientes.

Sequentes Canones, expeditioris praxeos gratia addidi; Eorum usus hujusmodi est.

Data *Æquatione*, respiciendum est ad ejusdem generis Canonem, Cujus prima Columna Theorematis dividendum secunda divisorem continet. Dividendo addatur numerus absolutus, & termini omnes disponantur contrariis (illis quæ sunt in *æquatione*) signis, termini vero divisoris iisdem.

Si termini aliqui in *Æquatione* defunt, correspondentes termini in Canone omittantur.

Si vel in Dividendo vel Divisore partes negativæ affirmatis prævaleant, Mutatis omnibus Signis tum Dividendi tum Divisoris affirmatæ reddantur, quod reductione patet; hoc tamen ad operandum non est necessarium.

Theoremata omnia ad *Æquationes Biquadratum non Excedentes* ut maxime necessaria aptanda curavi, pro superioris gradus ex Canonibus facile conficiantur.

(41)

Canon Quadratic.

$$\left. \begin{matrix} gg \\ bg \end{matrix} \right\} x$$

1	$aa + ba = c$	$x = \frac{c - gg - bg}{2g + b}$	$a = \frac{c + gg}{2g + b}$
2	$aa - ba = c$	$x = \frac{c + bg - gg}{2g - b}$	$a = \frac{c + gg}{2g - b}$
3	$-aa + ba = c$	$x = \frac{c + gg - bg}{b - 2g}$	$a = \frac{c - gg}{b - 2g}$
4	$aa = c$	$x = \frac{c - gg}{2g}$	$a = \frac{c + gg}{2g}$

Canon Cubick.

$$\left. \begin{matrix} ggg \\ bgg \\ cg \end{matrix} \right\} x$$

1	$aaa = b$	$x = \frac{b - ggg}{3gg}$	$a = \frac{b + 2ggg}{3gg}$
2	$aaa + ca = d$	$x = \frac{d - ggg - cg}{3gg + c}$	$a = \frac{d + 2ggg}{3gg + c}$
3	$aaa - ca = d$	$x = \frac{d + cg - ggg}{3gg - c}$	$a = \frac{d + 2ggg}{3gg - c}$
4	$-aaa + ca = d$	$x = \frac{d + ggg - cg}{c - 3gg}$	$a = \frac{d - 2ggg}{c - 3gg}$
5	$aaa + baa = c$	$x = \frac{c - ggg - bgg}{3gg + 2bg}$	$a = \frac{c + 2ggg + bgg}{3gg + 2bg}$
6	$aaa - baa = c$	$x = \frac{c + bgg - ggg}{3gg - 2bg}$	$a = \frac{c + 2ggg - bgg}{3gg - 2bg}$
7	$-aaa + baa = c$	$x = \frac{c + ggg - bgg}{2bg - 3gg}$	$a = \frac{c + bgg - 2ggg}{2bg - 3gg}$
8	$aaa + baa + ca = d$	$x = \frac{d - ggg - bgg - cg}{3gg + 2bg + c}$	$a = \frac{d + 2ggg + bgg}{3gg + 2bg + c}$
9	$aaa - baa + ca = d$	$x = \frac{d + bgg - ggg - cg}{3gg + c - 2bg}$	$a = \frac{d + 2ggg - bgg}{3gg + c - 2bg}$
10	$aaa + baa - ca = d$	$x = \frac{d + cg - ggg - bgg}{3gg + 2bg - c}$	$a = \frac{d + 2ggg + bgg}{3gg + 2bg - c}$
11	$aaa - baa - ca = d$	$x = \frac{d + bgg + cg - ggg}{3gg - 2bg - c}$	$a = \frac{d + 2ggg - bgg}{3gg - 2bg - c}$

12	$-aaa + baa + ca = d$	$x = d + ggg - bgg - cg$ $2bg + c - 3gg$	$a = d + bgg - 2ggg$ $2bg + c - 3gg$
13	$-aaa - baa + ca = d$	$x = d + ggg + bgg - cg$ $c - 3gg - 2bg$	$a = d - 2ggg - bgg$ $c - 3gg - 2bg$
14	$-aaa + baa - ca = d$	$x = d + ggg + cg - bgg$ $2bg - 3gg - c$	$a = d + bgg - 2ggg$ $2bg - 3gg - c$

Canon Biquadratic.

gggg	---	4ggg	} x
bggg	---	3bgg	
cgg	---	2cg	
dg	---	d	

1	$aaaa + baaa + caa + da = f$	$x = f - gggg - bggg - cgg - dg$ $4ggg + 3bgg + acg + d$	$a = f + 3gggg + 2bggg + cgg$ $4ggg + 3bgg + 2cg + d$
2	$aaaa + baaa + caa - da = f$	$x = f - gggg - bggg - cgg + dg$ $4ggg + 3bgg + 2cg - d$	$a = f + 3gggg + 2bggg + cgg$ $4ggg + 3bgg + 2cg - d$
3	$aaaa + baaa - caa - da = f$	$x = f + cgg + dg - gggg - bggg$ $4ggg + 3bgg - 2cg - d$	$a = f + 3gggg + 2bggg - cgg$ $4ggg + 3bgg - 2cg - d$
4	$aaaa - baaa - caa - da = f$	$x = f - bggg + cgg + dg - gggg$ $4ggg - 3bgg - 2cg - d$	$a = f + 3gggg - 2bggg - cgg$ $4ggg - 3bgg - 2cg - d$
5	$aaaa - baaa - caa + da = f$	$x = f - bggg + cgg - gggg - dg$ $4ggg + d - 3bgg - 2cg$	$a = f + 3gggg - 2bggg - cgg$ $4ggg + d - 3bgg - 2cg$
6	$aaaa - baaa + caa + da = f$	$x = f + bggg - gggg - cgg - dg$ $4ggg + 2cg + d - 3bgg$	$a = f + 3ggg - 2bggg - cgg$ $4ggg + 2cg + d - 2bgg$
7	$aaaa + baaa - caa + da = f$	$x = f - cgg - gggg - bggg - dg$ $4ggg + 3bgg + d - 2cg$	$a = f + 3gggg + 2bggg - cgg$ $4ggg + 3bgg + d - 2cg$
8	$aaaa - baaa + caa - da = f$	$x = f + bggg + dg - gggg - cgg$ $4ggg + 2cg - 3bgg - d$	$a = f + 3gggg + cgg - 2bggg$ $4ggg + 2cg - 3bgg - d$
9	$-aaaa + baaa + baa + da = f$	$x = f - bggg - cgg - dg + gggg$ $3bgg + 2cg + d - 4ggg$	$a = f + 2bggg + cgg - 3ggg$ $3bgg + 2cg + d - 4ggg$
10	$-aaaa - baaa + caa + da = f$	$x = f + gggg + bggg - cgg - dg$ $2cg + d - 4ggg - 2bgg$	$a = f + cgg - 3gggg - 2bggg$ $2cg + d - 4ggg - 3bgg$

11	— aaaa — baaa — caa — da = f	x = f + gggg + bggg + cgg — dg d — 4ggg — 3bgg — 2cg	a = f — 3gggg — 2bggg — cgg d — 4ggg — 3bgg — 2cg
12	— aaaa + baaa — caa — da = f	x = f + gggg + cgg — bggg — dg 3bgg + d — 4ggg — 2cg	a = f + 2bggg — 3gggg — cgg 3bgg + d — 4ggg — 2cg
13	— aaaa + baaa + caa — da = f	x = f + gggg + dg — bggg — cgg 3bgg + 2cg — 4ggg — d	a = f + 2bggg + cgg — 3gggg 3bgg + 2cg — 4ggg — d
14	— aaaa — baaa + caa — da = f	x = f + gggg + bggg + dg — cgg 2cg — 4ggg — 3bgg — d	x = f + cgg — 3gggg — 2bggg 2cg — 4ggg — 3bgg — d
15	— aaaa + baaa — caa — da = f	x = f + gggg + cgg + dg — bggg 3bgg — 4ggg — 2cg — d	a = f + 2bggg — 3gggg — cgg 3bgg — 4ggg — 2cg — d
16	aaaa + caa + da = f	x = f — gggg — cgg — dg 4ggg + 2cg + d	a = f + 3gggg + cgg 4ggg + 2cg + d
17	aaaa + caa — da = f	x = f — gggg + cgg + dg 4ggg + 2cg — d	a = f + 3gggg — cgg 4ggg + 2cg — d
18	aaaa — caa — da = f	x = f — gggg + cgg + dg 4ggg — 2cg — d	a = f + 3gggg — cgg 4ggg — 2cg — d
19	aaaa — caa + da = f	x = f — gggg — dg + cgg 4ggg + d — 2cg	a = f + 3gggg — cgg 4ggg + d — 2cg
20	— aaaa + caa + da = f	x = f + gggg — cgg — dg 2cg + d — 4ggg	a = f + cgg — 3gggg 2cg + d — 4ggg
21	— aaaa + caa — da = f	x = f + gggg + dg — cgg 2cg — 4ggg — d	a = f + cgg — 3gggg 2cg — 4ggg — d
22	— aaaa — caa + da = f	x = f + gggg + cgg — dg d — 4ggg — 2cg	a = f — 3gggg — 3cgg d — 4ggg — 2cg

23	$aaaa + baaa + caa = f$	$x = \frac{f - gggg - bggg - cgg}{4ggg + 3bgg + 2cg}$	$a = \frac{f + 3gggg + 2bggg + cgg}{4ggg + 3bgg + 2cg}$
24	$aaaa + baaa - caa = f$	$x = \frac{f + cgg - gggg - bggg}{4ggg + 3bgg - 2cg}$	$a = \frac{f + 3gggg + 2bggg - cgg}{4ggg + 3bgg - 2cg}$
25	$aaaa - baaa - caa = f$	$x = \frac{f + bggg + cgg - gggg}{4ggg - 3bgg - 2cg}$	$a = \frac{f + 3gggg - 2bggg - cgg}{4ggg - 3bgg - 2cg}$
26	$aaaa - baaa + caa = f$	$x = \frac{f + bggg - gggg - cgg}{4ggg + 2cg - 3bgg}$	$a = \frac{f + 3gggg + cgg - 3bgg}{4ggg + 2cg - 3bgg}$
27	$-aaaa + baaa + caa = f$	$x = \frac{f + gggg - bggg - cgg}{3bgg + 2cg - 4ggg}$	$a = \frac{f + 2bggg + cgg - 3ggg}{3bgg + 2cg - 4ggg}$
28	$-aaaa + baaa - caa = f$	$x = \frac{f + gggg + cgg - bggg}{3bgg - 4ggg - 2cg}$	$a = \frac{f + 2bggg - 3gggg - cgg}{3bgg - 4ggg - 2cg}$
29	$-aaaa - baaa + caa = f$	$x = \frac{f + gggg + bggg + cgg}{2cg - 4ggg - 3bgg}$	$a = \frac{f + cgg - 3g^4 - 2bgg}{2cg - 4ggg - 3bgg}$
30	$aaaa + baaa + ca = f$	$x = \frac{f - gggg - bggg - cg}{4ggg + 3bgg - c}$	$a = \frac{f + 3gggg - 2bggg}{4ggg + 3bgg + c}$
31	$aaaa + baaa - ca = f$	$x = \frac{f - gggg - bggg + cg}{4ggg + 3bgg - c}$	$a = \frac{f + 3g^4 + 2bggg}{4ggg + 3bgg - c}$
32	$aaaa - baaa - ca = f$	$x = \frac{f - gggg + bggg + cg}{4ggg - 3bgg - c}$	$a = \frac{f + 3gggg - 2bggg}{4ggg - 3bgg - c}$
33	$aaaa - baaa + ca = f$	$x = \frac{f - gggg + bggg - cg}{4ggg + c - 3bgg}$	$a = \frac{f + 3gggg - 2bggg}{4ggg + c - 3bgg}$
34	$-aaaa + baaa + ca = f$	$x = \frac{f + gggg - bggg - cg}{3bgg + c - 4ggg}$	$a = \frac{f + 2bggg - 3gggg}{3bgg + c - 4ggg}$

35	$-aaaa + baaa - ca = f$	$x = \frac{f + gggg + cg - bggg}{3bgg - 4ggg - c}$	$a = \frac{f + 2bggg - 3gggg}{3bgg - 4ggg - c}$
36	$-aaaa - baaa + ca = f$	$x = \frac{f + gggg + bggg - cg}{c - 4ggg - 3bgg}$	$a = \frac{f - 3gggg - 2bggg}{c - 4ggg - 3bgg}$
37	$aaaa + baaa = f$	$x = \frac{f + gggg - bggg}{4ggg + 3bgg}$	$a = \frac{f + 3gggg + 2bggg}{4ggg + 3bgg}$
38	$aaaa - baaa = f$	$x = \frac{f + bggg - gggg}{4ggg - 3bgg}$	$a = \frac{f + 3gggg - 2bggg}{4ggg - 3bgg}$
39	$-aaaa + baaa = f$	$x = \frac{f + gggg - bggg}{3bgg - 4ggg}$	$a = \frac{f + 2bggg - 3gggg}{3bgg - 4ggg}$
40	$aaaa + baa = f$	$x = \frac{f - gggg - bgg}{4ggg + 2bg}$	$a = \frac{f + 3gggg + bgg}{4ggg + 2bg}$
41	$aaaa - baa = f$	$x = \frac{f + gggg + bgg}{4ggg - 2bg}$	$a = \frac{f + 3gggg - bgg}{4ggg - 2bg}$
42	$-aaaa + baa = f$	$x = \frac{f + gggg - bgg}{2bg - 4ggg}$	$a = \frac{f + bgg - 3gggg}{2bg - 4ggg}$
43	$aaaa + ba = f$	$x = \frac{f - gggg - bgg}{4ggg + b}$	$a = \frac{f + 3gggg}{4ggg + b}$
44	$aaaa - ba = f$	$x = \frac{f - gggg + bg}{4ggg - b}$	$a = \frac{f + 3gggg}{4ggg - b}$
45	$-aaaa + ba = f$	$x = \frac{f + gggg - bg}{b - 4ggg}$	$x = \frac{f - 3gggg}{b - 4ggg}$
46	$aaaa = f$	$x = \frac{f - gggg}{4ggg}$	$a = \frac{f + 3gggg}{4ggg}$

Canon pro potestate Quinta.

ggggg
bgggg
cggg
dgg
fgg

5gggg
4bggg
3cgg } x
2dgg }
fgg }

Canon pro potestate Sexta.

gggggg
bggggg
cgggg
dggg
fgg
hg

6ggggg
5bgggg
4cggg
3dgg } x
2fgg }
hg }

Canon pro potestate Septima.

ggggggg
 bgggggg
 cgggggg
 dggggg
 fggg
 hgg
 kg

7gggggg }
 6bggggg }
 5cgggg }
 4dgggg } x
 3fgg }
 2hg }
 k }
 j }

Canon pro potestate Octava.

gggggggg
 bggggggg
 cggggggg
 dgggggg
 fggg
 hggg
 kgg
 lg

8ggggggg }
 7bgggggg }
 6cggggg }
 5dgggg }
 4fggg } x
 3hgg }
 2kg }
 l }

Canon pro potestate Nona.

gggggggggg	9ggggggggg	} x
bggggggggg	8bgggggggg	
cggggggggg	7cgggggggg	
dggggggggg	6dggggggg	
fgggggggg	5fgggggg	
hggggggg	4hggggg	
kgggggg	3kgggg	
lgggggg	2lgggg	
mgggggg	mgggggg	
	m	

Canon pro potestate Decima.

gggggggggg	10ggggggggg	} x
bggggggggg	9bgggggggg	
cggggggggg	8cgggggggg	
dggggggggg	7dggggggg	
fgggggggg	6fgggggg	
hggggggg	5hggggg	
kgggggg	4kgggg	
lgggggg	3lgggg	
mgggggg	2mgggg	
ngggggg	ngggggg	