Letter to Charles Montagu describing the solution to the mathematical problems proposed by John Bernoulli

Author: Isaac Newton

Source: EL/N1/61a, Royal Society Library, London, UK

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3. Epistola, præhonorabili viro D. Carolo Mountague Armig. Scaccarij Cancellario & S. R. Præsidi, inscripta qua solvuntur duo problemata Mathematica a Johanne Bernoullo Mathematico celeberrimo proposita.

Ian. 30. $169\frac{6}{7}$.

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Accepi, Vir Amplissime, hesterno die duo Problematum a Joanne Bernoullo Mathematicorum acutissimo propositorum exemplaria Groningæ edita in hæc verba.

Acutissimis qui toto Orbe florent Mathematicis
S. P. D.
Ioannes Bernoulli Math. P. P.

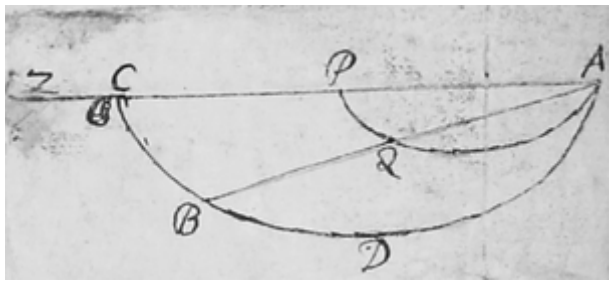
Cum compertum habeamus ✣ &c ..... eruendam relinquimus.

Dabam Groningæ ipsis Cal. Ian. 1697.

Hactenus Bernoullus: Problematum verò solutiones sunt hujusmodi

Problema I.

Investiganda est curva Linea ADB in qua grave a dato quovis puncto A ad datum quodvis punctum B vi gravitatis suæ citissimè descendet.

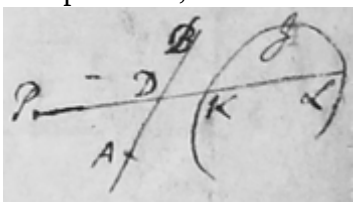


Solutio.

A dato puncto A ducatur recta infinita APCZ horizonti parallela et super eadem recta describatur tum Cyclois quæcunque AQP rectæ AB (ductæ et si opus est productæ) occurrens in puncto Q, tum Cyclois alia ADC cujus basis et altitudo sit ad prioris basem et altitudinem respectivè ut AB ad AQ. Et hæc Cyclois novissima transibit per punctum B et erit Curva illa linea in qua grave a puncto A ad punctum vi gravitatis suæ citissime perveniet. Q.E.I.

[1]Problema II{.}

Problema alterum, si recte intellexi, (nam quæ in Actis Lips. ab Auctore citantur ad id spectantia, nondum vidi,) sic proponi potest. Quæritur Curva KIL ea lege ut si recta PKL a dato quodam puncto P, ceu Polo, utcunque ducatur, et eidem Curvæ in punctis duobus K et L occurrat, potestates duorum ejus segmentorum PK et PL a dato illo puncto P ad occursus illos ductorum, si sint æque altæ (id est vel quadrata, vel cubi vel quadrato-quadra{ta} &c) datam summam $\mathrm{PK^q + PL^q}$ vel $\mathrm{PK^{cub} + PL^{cub}}$ &c (in omni rectæ illius positione) conficiant.



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Solutio.

Per datum quodvis punctum A ducatur recta quævis infinita positione data ADB rectæ mobili PKL occurrens in D, et nominentur AD x et PK vel PL y, sintque Q et R quantitates ex quantitatibus quibuscunque dat{is} et quantitate x quomodocunque constantes et relatio inter x et y definiatur per hanc æquationem $\mathrm{yy + Qy + R = 0}$. Et si R sit quantitas data, Rectangulum sub segmentis PK et PL dabitur. Si Q sit quantitas data summa segmentorum illorum (sub signis propri{js} conjunctorum) dabitur. Si $\mathrm{QQ - 2R}$ datur, summa quadratorum $\mathrm{(PK^q + PL^q)}$ dabitur. Si $\mathrm{Q^3 - 3QR}$ data sit quantitas, summa cuborum $\mathrm{\left(PK^{cub} + PL^{cub}\right)}$ dabitur. Si $\mathrm{Q^4 - 4QQR + 2RR}$ data sit quantitas summa quadrato-quadratorum $\mathrm{(PK^{qq} + PL^{qq})}$ dabitur. Et sic deinceps in infinitum. Efficiatur itaque ut R, Q, $\mathrm{QQ - 2R}$, $\mathrm{Q^3 - 3QR}$ &c datæ sint quantitates & Problema solvetur. Q.E.F.

Ad eundem modum Curvæ inveniri possunt quæ tria vel plura abscindent segmenta similes proprietates habentia. Sit æquatio $\mathrm{y^3 + Qyy + Ry + S = 0}$ ubi Q, R et S quantitates significant ex quantitatibus quibuscunque datis et quantitate x utcunque constantes; et Curva abscindet segmenta tria. Et si S data sit quantitas contentum solidum illorum trium dabitur [Si Q sit quantitas data, summa trium illorum dabitur]. Si $\mathrm{QQ - 2R}$ sit data quantitas, summa quadratorum ex tribus illis dabitur.

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A Solution of
Bernoulli's Problemes.
Published in Ph: Tr.
V. L. Abr. V 1. p. 551.

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Newton

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B. 2. 53.

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N P

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For the Right Honourable Cha: Montagu **{**Esq.**}**
Chancellour of the Exchequer

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Read Febr: 24: 1696.
Phil. Trans: 224.

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[1] Mmm **{**Terna**}** fol. 389.