NASIONALE SENIOR SERTIFIKAAT-EKSAMEN
NOVEMBER 2022

WISKUNDE: VRAESTEL I

NASIENRIGLYNE

Tyd: 3 uur 150 punte

Hierdie nasienriglyne is opgestel vir gebruik deur eksaminators en hulp-eksaminators van wie verwag word om almal 'n standaardiseringsvergadering by te woon om te verseker dat die riglyne konsekwent vertolk en toegepas word by die nasien van kandidate se skrifte.

Die IEB sal geen bespreking of korrespondensie oor enige nasienriglyne voer nie. Ons erken dat daar verskillende standpunte oor sommige aangeleenthede van beklemtoning of detail in die riglyne kan wees. Ons erken ook dat daar sonder die voordeel van die bywoning van 'n standaardiseringsvergadering verskillende vertolkings van die toepassing van die nasienriglyne kan wees.

AFDELING A

VRAAG 1

(a) (1) $x = \frac{1}{3}$ of $x = 4$

(2) $3x = \log_2 7$

$x = 0{,}9$

(3) $x(x - 1) < 20$

$x^2 - x - 20 < 0$

$(x - 5)(x + 4) < 0$

$-4 < x < 5$

(b) $x^2 - 6x - 2p = 0$

$\Delta = (-6)^2 - 4(1)(-2p)$

$36 + 8p = 0$

$p = -4{,}5$

Alternatiewe oplossing

$x^2 - 6x - 2p = 0$

$-2p = 9$ (Skep 'n volkome vierkant)

$p = -4{,}5$

VRAAG 2

(a) $(x + 3)^{\frac{1}{3}} = -2$

$x + 3 = -8$

$x = -11$

(b) $\log_3(x + 5) - \log_3 x = 1.$

$\frac{(x+5)}{x} = 3$

$3x = x + 5$

$2x = 5$

$x = 2{,}5$

(c) (1) $x > 7$

(2) $\sqrt{7 - x} + 2 = x + 1$

$\sqrt{7 - x} = x - 1$

$7 - x = x^2 - 2x + 1$

$0 = x^2 - x - 6$

$0 = (x - 3)(x + 2)$

$x = 3 \quad x \neq -2$

VRAAG 3

(a) $g(x) = -3x^2$

$$g'(x) = \lim_{h \to 0} \frac{-3(x+h)^2 - (-3x^2)}{h}$$

$$= \lim_{h \to 0} \frac{-3x^2 - 6xh - 3h^2 + 3x^2}{h}$$

$$= \lim_{h \to 0} \frac{h(-6x - 3h)}{h}$$

$g'(x) = -6x$ (Notasie)

(b) $\mathrm{f}(x) = \frac{5}{3x} + \sqrt[3]{x^5}$

$f(x) = \frac{5}{3}x^{-1} + x^{\frac{5}{3}}$

$f'(x) = -\frac{5}{3}x^{-2} + \frac{5}{3}x^{\frac{2}{3}}$

(c) (1) A(0; –3)

$x^2 - 2x - 3 = 0$

$x = -1$ or $x = 3$

B(3; 0)

(2) $m_{AB} = 1$

$f'(x) = 2x - 2$

$2x - 2 = 1$

$x = \frac{3}{2}$

$y = \left(\frac{3}{2}\right)^2 - 2\left(\frac{3}{2}\right) - 3$

$y = -\frac{15}{4}$

VRAAG 4

(a) (1) $5n - 2 = 198$

$5n = 200$

$n = 40$

(2) $S_{40} = \frac{40}{2}[2(3) + (40 - 1)5]$

$S_{40} = 4020$

Alternatief:

$S_n = \frac{n}{2}(a + l) = \frac{40}{2}(3 + 198)$

$S_{40} = 4020$

(b) $S_9 = 8 - 2^{3-9} = 7\frac{63}{64}$

$S_8 = 8 - 2^{3-8} = 7\frac{31}{32}$

$T_9 = 7\frac{63}{64} - 7\frac{31}{32} = \frac{1}{64}$

Alternatiewe oplossing:

$S_1 = T_1 = 8 - 2^2 = 4$

$S_2 = T_1 + T_2 = 8 - 2 = 6 \quad \therefore T_2 = 2$

$T_9 = ar^8 = 4\left(\frac{1}{2}\right)^8 = \frac{1}{64}$

VRAAG 5

(a) $g(x) = x^3 - 3x$

$g'(x) = 3x^2 - 3$

$3x^2 - 3 = 0$

$(x + 1)(x - 1) = 0$

$x = -1$ or $x = 1$

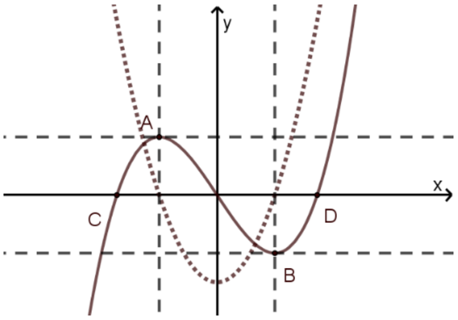
$A(-1; 2)$

$B(1; -2)$

(b) x-afsnitte

y-afsnit

Vorm



(c) $g'(x) = 3x^2 - 3$

$g'(3) = 3(3)^2 - 3$

$g'(3) = 24$

$g(3) = (3)^3 - 3(3)$

$g(3) = 18$

$y = 24x + c$

$18 = 24(3) + c$

$c = -54$

$y = 24x - 54$

VRAAG 6

(a) $A = 450\ 000(1 + 0{,}06)^5$

$A = \text{R}602\ 201{,}\ 51$

(b) $A = 450\ 000(1 - 0{,}2)^5$

$A = \text{R}147\ 456$

(c) R602 201,51 – R147 456

= R454 745,51

$$454\ 745{,}51 = \frac{x[\left(1 + \frac{0{,}09}{12}\right)^{60} - 1]}{\frac{0{,}09}{12}}$$

$x = \text{R}6\ 029{,}18$

AFDELING B

VRAAG 7

(a) $A = \dfrac{14\,500[1 - \left(1 + \frac{0,12}{12}\right)^{-240}]}{\frac{0,12}{12}}$

Leningsbedrag = R1 316 800

(b) $A = 1\,316\,800\left(1 + \dfrac{0,12}{12}\right)^{96}$

A = R3 422 722, 59

Toekomstige waarde van betalings

$F_v = \dfrac{14\,500[\left(1 + \frac{0,12}{12}\right)^{96} - 1]}{\frac{0,12}{12}}$

F_v = R2 318 945,74

Saldo uitstaande = R1 103 776, 85

VRAAG 8

(a) $14 + 17 + 20 + 23 + \ldots + (3x + 5) = 711$

$711 = \frac{n}{2}(2(14) + (n - 1)(3))$ Of alternatief: $711 = \frac{x-2}{2}(14 + 3x + 5)$

$711 = \frac{n}{2}(3n + 25)$

$0 = 3n^2 + 25n - 1422$

$n = 18$ or $n \neq -\frac{79}{3}$

dus

$x = 20$

OF

$8 + 11 + 14 + \ldots + (n\ terme) = 730$

$730 = \frac{n}{2}(2(8) + (n - 1)(3))$

$0 = 3n^2 + 13n - 1460$

$n = 20$ of $n \neq -\frac{73}{3}$

dus

$x = 20$

(b) (1) $16 = \frac{a}{1 - \frac{3}{4}}$

$AB = 4$

(2) BC = 3 meter

Wanneer $x = \frac{11}{2}$ word die maksimum hoogte bereik.

$y = -\frac{1}{2}(\frac{11}{2} - 4)(\frac{11}{2} - 7)$

$y = \frac{9}{8}$ meter of 1,1 meter (afgerond tot een desimale plek)

Maksimum hoogte tussen B en C is 1,125 meter.

VRAAG 9

(a) (1) $-x + 6 = x - 4$

$-2x = -10$

$x = 5$

$y = -(5) + 6$

$y = 1$

$h(x) = \frac{a}{x - 5} + 1$

$2 = \frac{a}{9 - 5} + 1$

$a = 4$

$p = 5$ *en* $q = 1$

(2) $0 = \frac{4}{x - 5} + 1$

$-x + 5 = 4$

$x = 1$

$A(1; 0)$

$x - 4 = \frac{4}{x - 5} + 1$ (Hiperboolafsnitte met simmetrie-as)

$x^2 - 9x + 20 = 4 + x - 5$

$x^2 - 10x + 21 = 0$

$(x - 7)(x - 3) = 0$

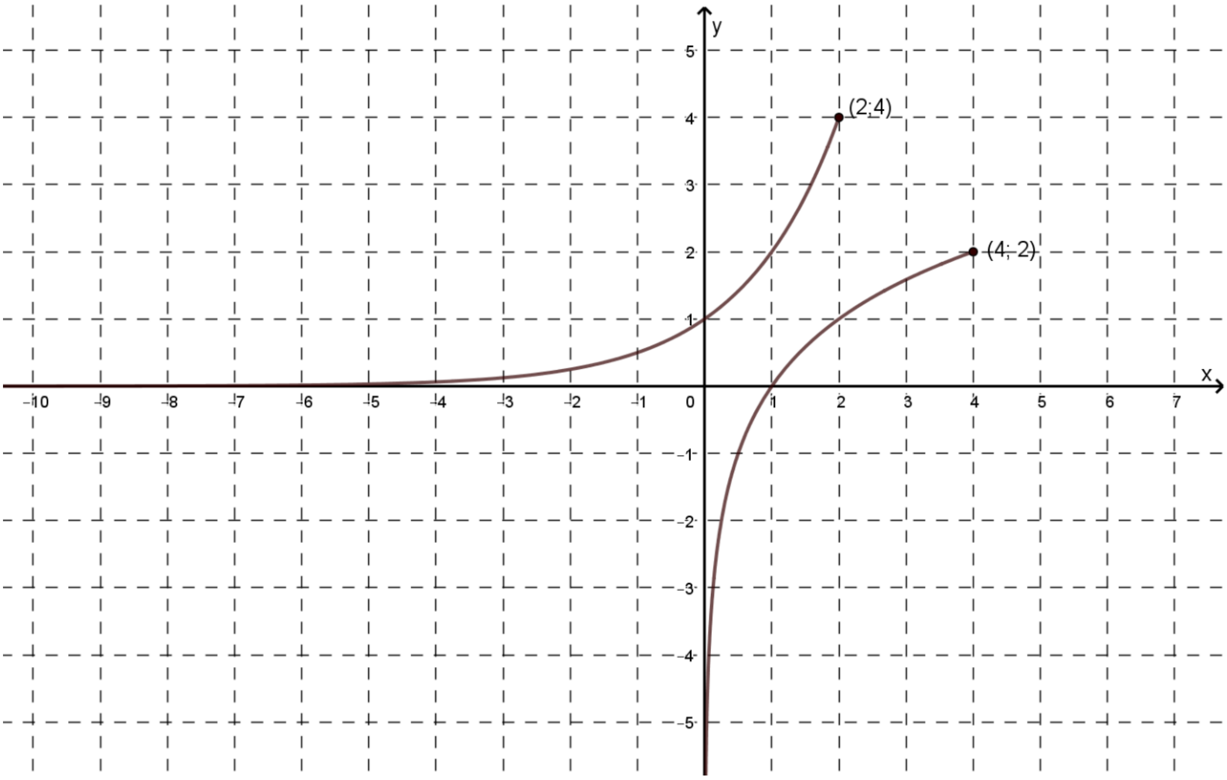
$x = 7$ of $x = 3$

$y = (7) - 4 = 3$

$C(7; 3)$

Oppervlakte van reghoek = $6 \times 3 = 18$ eenhede^2

(b) (1) x-afsnit (4; 2) vorm en asimptoot



(2) x-afsnit (2; 4) vorm en asimptoot

(3) $x \in (-\infty; 2]$

(4) $g'(x) > 0$

$$\frac{g^{-1}(x)}{g(x)} \leq 0$$

$0 < x < 1$ (Notasie)

VRAAG 10

(a) (1) 5! of 120

(2) $\frac{3!}{120} = 0{,}05$ of $\frac{1}{20}$

(3) 6 9 _ _ 8 $2 \times 1 = 2$ vir die split

$$\left.\begin{array}{ll} 8\ \_\ \_\ \_\ 6 & 3 \times 2 \times 1 = 6 \\ 9\ \_\ \_\ \_\ 6 & 3 \times 2 \times 1 = 6 \\ 9\ \_\ \_\ \_\ 8 & 3 \times 2 \times 1 = 6 \end{array}\right\}$$

Totale unieke ewe getalle = 20

Alternatief: _ _ _ _ 6: $2 \times 3 \times 2 \times 1 = 12$

9 _ _ _ 8: $3 \times 2 \times 1 = 6$

6 _ _ _ 8: $1 \times 2 \times 1 = 2$

(b) (1) $19\,500 \times \frac{1}{65} = 300$ ketels

(2) $\left(\frac{64}{65}\right)^{150} = 0{,}0977$

(c) $x(x + 0{,}6) = 0{,}36 - x$

$x^2 + 0{,}6x - 0{,}36 + x = 0$

$x^2 + 1{,}6x - 0.36 = 0$

$(x - 0{,}2)(x + 1{,}8) = 0$

$x > 0$ dus $x = 0{,}2$

VRAAG 11

(a) $OB = 5$

Dus $q = 3$ meter

$-x^2 + 2x + 3 = 0$
$0 = x^2 - 2x - 3$
$0 = (x - 3)(x + 1)$
$x = 3$ of $x = -1$

$C(3; 0)$

$D(10; 0)$

$y = -\frac{1}{2}x + 5$

$y = -\frac{1}{2}(3) + 5$

$y = \frac{7}{2}$

$E(3; \frac{7}{2})$

$EC = 3\frac{1}{2}$ meter

(b) Vertikale afstand $= -\frac{1}{2}x + 5 - (-x^2 + 2x + 3)$

Vertikale afstand $= -\frac{1}{2}x + 5 + x^2 - 2x - 3$

Vertikale afstand $= x^2 - \frac{5}{2}x + 2$

$\frac{d_{VD}}{d_X} = 2x - \frac{5}{2}$

$2x - \frac{5}{2} = 0$

$x = \frac{5}{4}$ or 1,25

Minimum vertikale afstand $= (1{,}25)^2 - \frac{5}{2}(1{,}25) + 2$

Minimum vertikale afstand = 0,4375 meter of 43,75 cm of 43,8 cm

Jou vriend se bewering is korrek.

VRAAG 12

$y = a(x - 2)^3 + 2$

$-14 = a(0 - 2)^3 + 2$

$-16 = -8a$

$a = 2$

$0 = 2(x - 2)^3 + 2$

$x = 1$

Alternatiewe oplossing:

$f'(x) = a(x - 2)^2$

$54 = 9a \quad \therefore a = 6$

$f'(x) = 6x^2 - 24x + 24$

$f(x) = 2x^3 - 12x^2 + 24x - 14$

$f(1) = 0$

$\therefore x = 1$

Totaal: 150 punte