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INTERNASIONALE SEKONDÊRE SERTIFIKAAT-EKSAMEN
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WISKUNDE: VRAESTEL I

NASIENRIGLYNE

Tyd: 3 uur

150 punte

Hierdie nasienriglyne word voorberei vir gebruik deur eksaminatore en hulpeksaminatore. Daar word van alle nasieners vereis om 'n standaardiseringsvergadering by te woon om te verseker dat die nasienriglyne konsekwent vertolk en toegepas word tydens die nasien van kandidate se skrifte.

Die IEB sal geen gesprek aanknoop of korrespondensie voer oor enige nasienriglyne nie. Daar word toegegee dat verskillende menings rondom sake van beklemtoning of detail in sodanige riglyne mag voorkom. Dit is ook voor die hand liggend dat, sonder die voordeel van bywoning van 'n standaardiseringsvergadering, daar verskillende vertolkings mag wees oor die toepassing van die nasienriglyne.

AFDELING A**VRAAG 1**

$$(a) \quad 2^x + 2 \cdot 2^x + 2^2 \cdot 2^x \\ = 7 \cdot 2^x$$

$$(b) \quad x = -8 \text{ of } x = -2 \\ x^2 \neq 8$$

$$(c) \quad \sqrt{y+10} = y-2 \\ \therefore y+10 = y^2 - 4y + 4 \\ 0 = y^2 - 5y - 6 \\ 0 = (y-6)(y+1)$$

$$x(x+1) = 6 \\ x^2 + x - 6 = 0 \\ (x+3)(x-2) = 0 \\ x = -3, x = 2$$

$$x(x+1) = -1 \\ x^2 + x + 1 = 0 \\ \text{NVT}$$

OF hulle kon elimineer voor
hulle terugvervang $y \neq -1$

Studente wat in terme van x gebly het, beide kante gekwadreer het en by die korrekte bikwadraat uitgekom het, word 1 punt toegeken. Korrekte oplossing in terme van x sou vyf punte gekry het.

VRAAG 2

$$(a) \quad \log 7,5 \\ \log 15 - \log 2 \text{ of enige redelike ekwivalent} \\ = \log 5 + \log 3 - \log 2 \text{ of enige redelike ekwivalent/ca} \\ = \log 10 - \log 2 + \log 3 - \log 2 \text{ of enige redelike ekwivalent/ca} \\ = a - 2b + 1$$

$$(b) \quad \log_2(x+1) + \log_2(x-5) = \log_2 7 \\ \therefore \log_2(x+1)(x-5) = \log_2 7 \\ x^2 - 4x - 5 = 7 \\ x^2 - 4x - 12 = 0 \\ (x-6)(x+2) = 0 \\ x = 6; x \neq -2$$

$$(c) \quad \log(y-1) = \log x^2 + \log 4 \\ \therefore \log(y-1) = \log 4x^2 \\ \therefore y-1 = 4x^2 \\ \therefore y = 4x^2 + 1$$

VRAAG 3

$$(a) \quad 41167,14 = P \left(1 + \frac{0,15}{12} \right)^{84}$$

$$\therefore D = R14\,500,00$$

$$(b) \quad (i) \quad R450\,000$$

(ii) verminderende saldo alle redelike ekwivalente word krediet gegee

$$(iii) \quad 302\,580 = 480\,000(1-i)^2$$

$$\therefore i = 0,18 \text{ of } 18\%$$

Punt toegeken vir korrekte A en P, korrekte n, formule akkurate antwoord

$$(iv) \quad x = 450\,000(1-0,18)^7$$

$$= R112\,178,46$$

VRAAG 4

$$(a) \quad f'(x) = \lim_{h \rightarrow 0} \frac{-3(x+h)^2 + 4 + 3(x^2 - 4)}{h}$$

Een punt formule, een punt korrekte vervanging

$$= \lim_{h \rightarrow 0} \frac{-6xh - 3h^2}{h}$$

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

$$= -6x$$

$$(b) \quad (i) \quad f(x) = \frac{1}{2}x^2 - 3x^{-3}$$

$$f'(x) = x + \frac{9}{x^4}$$

$$\therefore f'(-1) = -1 + 9$$

$$= 8$$

$$(ii) \quad f(-1) = \frac{1}{2}(-1)^2 - \frac{3}{(-1)^3}$$

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

$$\therefore y - \frac{7}{2} = 8(x+1)$$

$$y = 8x + \frac{23}{2}$$

$$2y = 16x + 23$$

$$16x - 2y = -23$$

VRAAG 5

$$\begin{aligned}
 \text{(a)} \quad f(x) &= -(x^2 - 4x - 10) \\
 &= -[(x-2)^2 - 4 - 10] \\
 &= -(x-2)^2 + 14
 \end{aligned}$$

$$\text{(b)} \quad k = 2 \quad \text{aanvaar } x, \text{ en } > =$$

$$\begin{aligned}
 \text{(c)} \quad x &= -(y-2)^2 + 14 \\
 \therefore f^{-1}(x) &= 2 + \sqrt{14 - x}
 \end{aligned}$$

VRAAG 6

$$\begin{aligned}
 \text{(a)} \quad T_3 - T_2 &= T_2 - T_1 \\
 2(x-3) &= 2x - 4 + 8 - 2x \\
 \therefore x &= 5 \\
 \therefore a &= 6 \quad d = -4 \\
 S_{15} &= \frac{15}{2} [2(6) + 14(-4)] \\
 &= -330
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad r &= \frac{1}{2} \quad a = \frac{1}{2} \\
 \therefore S_{\infty} &= \frac{\frac{1}{2}}{1 - \frac{1}{2}} = 1
 \end{aligned}$$

$$\begin{aligned}
 \text{(c)} \quad -1 &< 2 - 3x < 1 \\
 1 &> 3x - 2 > -1 \\
 3 &> 3x > 1 \\
 1 &> x > \frac{1}{3}
 \end{aligned}$$

VRAAG 7

$$(a) \quad 0,06 = \left(1 + \frac{r}{n}\right)^n - 1$$

$$r = 0,05841 \dots$$

$$F = \frac{2\,500 \left[\left(1 + \frac{0,058}{12}\right)^{120} - 1 \right]}{\frac{0,058}{12}}$$

$$= R410\,660,73$$

$$(b) \quad 3\,000\,000 = \frac{60\,000 \left[1 - \left(\frac{0,075}{4} \right)^{-n} \right]}{\frac{0,075}{4}}$$

$$n \approx 149,253 \dots$$

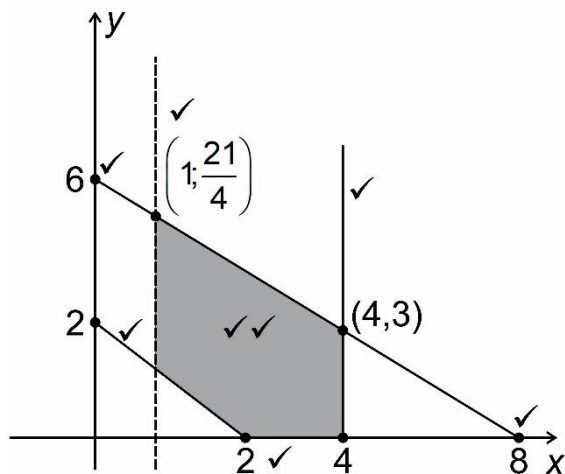
$\therefore$ 150 kwartale

$$\frac{150}{4} = 37 \text{ jaar en 2 kwartale}$$

$\therefore$ 1 Augustus 2060

AFDELING B**VRAAG 8**

(a)



(b) $P = 3(4) - 2(0)$
 $= 12$

Skryf gradiënt van soeklyn kry twee punte.

Toets van minstens drie hoekpunte insluitend korrek kry 2 punte

VRAAG 9

(a) $t = 0 : h = 3 \text{ m}$

(b) $\frac{dh}{dt} = -2t + 6$
 $0 = -2t + 6$ stel tot 0 gelyk
 $\therefore t = 3$ by maks hoogte
 $h_{\min} = -3^2 + 6(3) + 3$
 $= 12 \text{ m}$

VRAAG 10

(a) $f(x) = -2x + 12$

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

$$0 = \frac{a}{4} + 3$$

$$a = -12$$

(b) $\frac{-12}{x-2} + 3 = -2x + 12$ gelykstelling

$$\frac{-12}{x-2} = 9 - 2x$$

$$-12 = 9x - 2x^2 - 18 + 4x \quad \text{LCD}$$

$$\therefore 2x^2 - 13x + 6 = 0$$

$$(2x-1)(x-6) = 0$$

$$\therefore x = \frac{1}{2}$$

$$y = -2\left(\frac{1}{2}\right) + 12 \quad \text{ca}$$

$$= 11$$

(c) $x \leq \frac{1}{2}$ of $2 < x \leq 6$

(d) $k > -\frac{1}{2}$ of $k < -6$

VRAAG 11

(a) $31 = 2 + a + b + 20$

$$\therefore a + b = 9 \dots (1)$$

$$\frac{dy}{dx} = 6x^2 + 2ax + b$$

$$0 = 6 + 2a + b \dots (2)$$

$$\therefore a + (-2a - 6) = 9$$

$$\therefore -a = 15$$

$$\therefore a = -15$$

$$\therefore b = 24$$

(b) $0 = 6x^2 - 30x + 24$

$$0 = x^2 - 5x + 4$$

$$0 = (x - 4)(x - 1)$$

$$\therefore (4; 4)$$

Buigpunt

$$\frac{d^2y}{dx^2} = 12x - 30$$

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

$$\therefore \left(\frac{5}{2}; \frac{35}{2} \right)$$

(c) $x \geq 4$ of $1 \leq x \leq \frac{5}{2}$

VRAAG 12

$$(a) \quad a = \frac{\pi r^2}{2} + 2rh$$

$$\begin{aligned}(b) \quad & 4r + 2h = 20 \\ & \therefore 2r + h = 10 \\ & \therefore h = 10 - 2r \\ & \therefore A = \frac{\pi r^2}{2} + 2r(10 - 2r) \\ & A = \frac{\pi r^2}{2} + 20r - 4r^2 \\ & \frac{dA}{dr} = \pi r + 20 - 8r \\ & r(8 - \pi) = 20 \\ & r = \frac{20}{8 - \pi} = 4,12 \text{ cm}\end{aligned}$$

$$\begin{aligned}(c) \quad & \frac{d^2 A}{dr^2} = \pi - 8 \\ & \therefore \frac{d^2 A}{dr^2} < 0 \quad \therefore \text{maksimum}\end{aligned}$$

VRAAG 13

$$\begin{aligned}
 \text{(a)} \quad & \sqrt{2\frac{7}{9}} \\
 &= \sqrt{\frac{25}{9}} \\
 &= \frac{5}{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad & \text{Resse} \\
 & 1, 0, 1, 0, 1, 0, \dots, 0 \text{ een punt as } 0,25 \text{ in plaas van } 1 \\
 & \therefore 1011 \times 1 = 1011
 \end{aligned}$$

$$\begin{aligned}
 \text{(c)} \quad & y = x^2 \\
 & \therefore x = \sqrt{y} \\
 & \therefore y + 4\sqrt{y} - 8 = 0 \\
 & 4\sqrt{y} = 8 - y \\
 & 16y = 64 + 16y + y^2 \\
 & \therefore y^2 - 32y + 64 = 0
 \end{aligned}$$

$$\begin{aligned}
 \text{(d)} \quad & \sum_{x=1}^{100} (6x^2 - 2x - 1) \\
 & 6 \sum_{x=1}^{100} x^2 - 2 \sum_{x=1}^{100} x - \sum_{x=1}^{100} 1 \\
 &= \frac{6 \times 100(101)(201)}{6} - \frac{2 \times 100 \times 101}{2} - 100 \\
 &= 2\,019\,900
 \end{aligned}$$

Totaal: 150 punte