GAUTENG DEPARTMENT OF EDUCATION
GAUTENGSE DEPARTEMENT VAN ONDERWYS

SENIOR CERTIFICATE EXAMINATION
SENIOR SERTIFIKAAT-EKSAMEN

ADDITIONAL MATHEMATICS HG
ADDISIONELE WISKUNDE HG

POSSIBLE ANSWERS / MOONTLIKE ANTWOORDE SUPP 2007

SECTION / AFDELING A
COMPULSORY / *VERPLIGTEND*
CALCULUS

QUESTION / *VRAAG* 1

1.1 s = r?

$\therefore s = 2.\frac{p}{6}$

circumference / *omtrek* = $\frac{\pi}{3}$ k

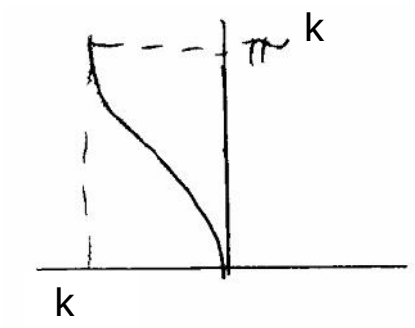
area / *oppervlakte* = ½ or / *of* ^{2}

= ½ . $\frac{\pi}{6}$ .4 k

= $\frac{\pi}{3}$ k (6)

1.2.1 -1 = x + 1 = 1 k
$\therefore$ -2 = x = 0 k (4)

1.2.2



(6)

k

1.3.1 arc sin / *bg sin* (- sin $\frac{\pi}{6}$)
= arc sin / *bg sin* (- ½) k
= -$\frac{\pi}{6}$ k (6)

1.3.2 $\tan \frac{7\pi}{12}$

$= \tan\left(\frac{\pi}{4} + \frac{\pi}{3}\right)$ k

$= \frac{\tan\frac{p}{4} + \tan\frac{p}{3}}{1 - \tan\frac{p}{4}.\tan\frac{p}{3}}$ k

$= \frac{1+\sqrt{3}}{1-\sqrt{3}}$ k

(6)

[28]

QUESTION / *VRAAG* 2

2.1.1 $\lim\limits_{x \to 2^-} f(x) = 4$ k **and/*en*** $\lim\limits_{x \to 2^+} f(x) = 4$ k

f(2) = 5 k

∴ Not continuous – removable / *Nie kontinu nie - verwyderbaar* k (8)

2.1.2 $\lim\limits_{x \to 4^-} f(x) = 2$ k **and/*en*** $\lim\limits_{x \to 4^+} f(x) = 2$ k

f(4) = 2 k

∴ Continuous at / *kontinu by* $x = 4$ (6)

2.2 $\lim\limits_{x \to 4^-} f'(x) = -1$ k **and/*en*** $\lim\limits_{x \to 4^+} f'(x) = 0$ k

∴ Not differentiable / *Nie differensieerbaar nie* (6)

[20]

QUESTION / *VRAAG* 3

3.1 $\lim\limits_{x \to \pi/4} \dfrac{\cos^2 x - \sin^2 x}{\cos x - \sin x}$ k $\left(\begin{matrix}0\\0\end{matrix}; \therefore \text{L'H}\right)$ k

$= \lim\limits_{x \to \pi/4} \dfrac{(\cos x - \sin x)(\cos x + \sin x)}{\cos x - \sin x}$ k $\lim\limits_{x \to \pi/4} \dfrac{-2\sin 2x}{-\sin x - \cos x}$ k

$= \lim\limits_{x \to \pi/4} (\cos x + \sin x)$ k $= \dfrac{-2}{-2/\sqrt{2}}$

$= 2.\ 1/\sqrt{2}$ k (or/*of* $\sqrt{2}$) (or / *of* 1,4) $= \sqrt{2}$ k (8)

3.2 $\lim\limits_{x \to \infty} \dfrac{x\left(\begin{matrix}2\\x\end{matrix} - 1\right)}{x\sqrt{9 + 1/x^2}}$ k k

$= -\dfrac{1}{3}$ k (6)

[14]

QUESTION / *VRAAG* 4

4.1 $f(x+h) - f(x) = \sqrt{2x + 2h - 1} - \sqrt{2x - 1}$ k

$f'(x) = \lim\limits_{h \to 0} \dfrac{\sqrt{2x+2h-1} - \sqrt{2x-1}}{h} \cdot \dfrac{\sqrt{2x+2h-1} + \sqrt{2x-1}}{\sqrt{2x+2h-1} + \sqrt{2x-1}}$ k

$= \lim\limits_{h \to 0} \dfrac{2x + 2h - 1 - 2x + 1}{h\left(\sqrt{2x + 2h - 1} + \sqrt{2x - 1}\right)}$ k

$= \dfrac{2}{\sqrt{2x-1} + \sqrt{2x-1}}$ k

$= \dfrac{1}{\sqrt{2x-1}}$ k (10)

4.2 $\dfrac{dy}{dx} = \dfrac{-\text{cosec}3x.\cot 3x.3.x^3 - \text{cosec}3x.3x^2}{x^6}$ k k k k (8)

4.3 $3\sin^2(\text{arc tan./bg tan } x).\cos(\text{arc tan/bg tan } x).\dfrac{1}{1+x^2}$ k k k (8)

4.4 $f(x) = 2(1 + 2x)^{-1}$ k

$f'(x) = -2^2(1 + 2x)^{-2}$ k

$f''(x) = 2.2^3(1 + 2x)^{-3}$

$f'''(x) = -3.2.2^4(1 + 2x)^{-4}$

$f^{(n)}(x) = (-1)^n.n!2^{n+1}(1 + 2x)^{-n-1}$ k (12)

k k k **[38]**

QUESTION / *VRAAG* 5

? $xi = \frac{3}{n}$ k

$xi = 3 + \frac{3i}{n}$ k

$f(xi) = \left(3 + \frac{3i}{n}\right)^2 - 4\left(3 + \frac{3i}{n}\right)$ k

$= 9 + \frac{18i}{n} + \frac{9i^2}{n^2} - 12 - \frac{12i}{n}$

$= \frac{9i^2}{n^2} + \frac{6i}{n} - 3$ k

$f(xi).\Delta xi = \frac{27i^2}{n^3} + \frac{18i}{n^2} - \frac{9}{n}$ k

$\sum_{i=1}^{n} f(xi).\Delta xi = \sum_{i=1}^{n}\left(\frac{27i^2}{n^3} + \frac{18i}{n^2} - \frac{9}{n}\right)$ k

$= \frac{27}{n^3}.\frac{n}{6}(n+1)(2n+1) + \frac{18}{n^2}\binom{n}{2}(n+1) - \frac{9}{n}.n$ k k

$\lim_{n \to \infty} \sum_{i=1}^{n} f(xi).\Delta xi = 9 + 9 - 9$

$= 9$ k

[20]

QUESTION / *VRAAG* 6

6.1 $\frac{1}{2}.(\text{bgtan}2x)^2 + k$ (6)

6.2 $$\int \frac{dx}{4\left(\left(\frac{3x}{2}\right)^2 + 1\right)}$$

$$= \frac{1}{6}\text{arc tan/bg tan}\frac{3x}{2}\cdot\frac{2}{3}\Big|_0^{2/\sqrt{3}} \qquad \frac{1}{6}\text{arc tan/bg tan}\frac{3x}{2} + C$$

$$= \frac{1}{4}\text{arc tan/bg tan}\frac{3}{\sqrt{3}}$$

$$= \frac{1}{6}\cdot\frac{?}{3} = \frac{?}{18}\text{ (of 0,1745)}$$

(12)

[18]

QUESTION / *VRAAG* 7

7.1 At a_1 the tangent to the curve cuts the x-axis at a_2. / *By a_1 sny die raaklyn aan die kromme die x-as by a_2.*
At a_2 the tangent to the curve cuts the x-axis at a_1. / *By a_2 sny die raaklyn aan die kromme die x-as by a_1.*
$\therefore$ the values oscillate and don't converge. / *die waardes ossileer en konvergeer nie.* (interpret answer / *interpreteer antwoord – dieselfde woorde nie nodig)* (6)

7.2 At b_1 the tangent to the curve is horizontal and will never cut the x-axis again. / *By b_1 is die raaklyn by die kromme horisontaal en sny glad nie die x-as weer nie.* (Memo open for any feasible answer). (4)

7.3 $f'(x) = -6x^2 + 4x + 2$

$$A_{n+1} = An - \frac{\left(-2a_n^3 + 2a_n^2 + 2a_n - 1\right)}{-6a_n^2 + 4a_n + 2}$$

$C_1 = 0,5$

$C_2 = 0,4$

$C_3 = 0,4030$

$C_4 = 0,4030$

$\therefore P \approx 0,403$ (10)

[20]

QUESTION / *VRAAG* 8

8.1 $A = \int_0^{3\pi/4} (\sin x + \cos x)\,dx$ k

$= (-\cos x + \sin x)\Big|_0^{3\pi/4}$ k

$= \left(-\cos\frac{3\pi}{4} + \sin\frac{3\pi}{4}\right) - (-\cos 0 + \sin 0)$ k - subst.

$= \cos\pi/4 + \sin\pi/4 - (-1)$ k - calc.

$= \frac{2}{\sqrt{2}} + 1 \qquad (\sqrt{2} + 1$ k *or/of* $2{,}41)$ (10)

8.2 $V = \pi \int_0^{3\pi/4} (\sin x + \cos x)^2\,dx$ k

$= \pi \int_0^{3\pi/4} (\sin^2 x + 2\sin x \cos x + \cos^2 x)\,dx$ k k

$= \pi \int_0^{3\pi/4} (1 + 2\sin x \cos x)\,dx$ k

$= \pi \int_0^{3\pi/4} (1 + \sin 2x)\,dx$ k

$= p\left(x - \frac{1}{2}\cos 2x\right)\Big|_0^{3p/4}$

$= \pi\left[\left(\frac{3\pi}{4} - \frac{1}{2}\cos\frac{3\pi}{2}\right) - \left(0 - \frac{1}{2}\cos 0\right)\right]$ k - subst. k calc.

$= p\ \frac{3p}{4} - 0 + \frac{1}{2}$ *OR/OF* $\frac{3p^2}{4} + 2$? k *OR/OF* *8,9729* (16)

[26]

QUESTION / *VRAAG* 9

9.1 $y + 4x = 78$

$y = 78 - 4x$ k

$V = x^2y$

$= x^2(78 - 4x)$ k

$= 78x^2 - 4x^3$ (4)

9.2 $\frac{dv}{dx} = 156x - 12x^2 = 0$ k k $\qquad \frac{d^2v}{dx^2} = 156 - 24x$ k

$x(13-x) = 0$ $\qquad$ **if/as** $x = 13$:

$x = 0$ **or/of** $x = 13$ k $\qquad 156 - 24(13) < 0$ k

$\therefore y = 78 - 4(13)$ $\qquad \therefore$ **max at / *maks by*** $x = 13$

$= 26$ k

$\therefore$ **dimensions / *afmetings*** $x = 13$

$y = 26$ (12)

[16]

TOTAL FOR SECTION A / TOTAAL VIR AFDELING A: [200]

SECTION / *AFDELING* B

FINANCIAL MATHEMATICS / *WISKUNDE VAN FINANSIES*

QUESTION / *VRAAG* 10

$P(q) = \frac{-2}{3}q^3 + 30q^2 + 3\,600q - 15\,000$ k

$P'(q) = -2q^2 + 60q + 3\,600 = 0$ k k

$\therefore q^2 - 30q - 1\,800 = 0$

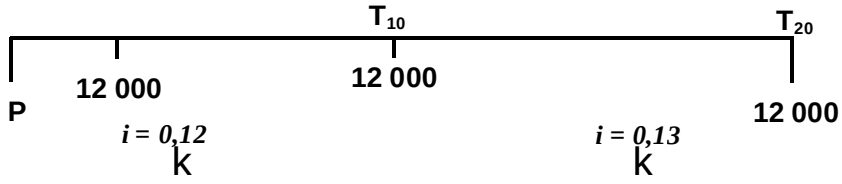
$(q - 60)(q + 30) = 0$ k

$q = 60$ k

$P(60) = R165\,000$ k k

[14]

QUESTION / *VRAAG* 11



$$P = \frac{x\,(1-(1+i)^{-n}}{i} \quad k$$

$$\therefore P = \frac{x(1-1{,}12^{-10})}{0{,}12} + \frac{x(1-1{,}13^{-10})\,(1{,}12)^{-10}}{0{,}13} \quad k \quad k \quad k \qquad \textit{or / of}$$

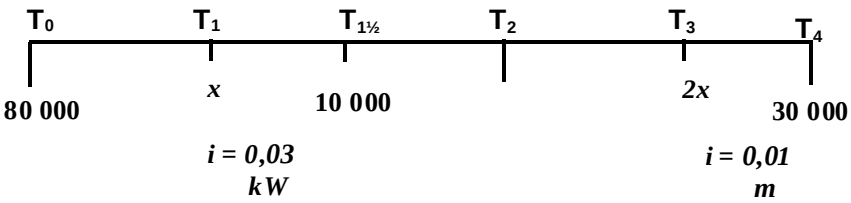
$$P = x(1{,}12)^{-1}\left(\frac{1-1{,}12^{-10}}{1-1{,}12^{-1}}\right) + x(1{,}12)^{-10}\,(1{,}13)^{-1}\left(\frac{1-1{,}13^{-10}}{1-1{,}13^{-1}}\right)$$

(12)

[12]

QUESTION / *VRAAG* 12

12.1



T_2: $80\,000\,(1{,}03)^8 = x(1{,}03)^4 + 10\,000\,(1{,}03)^2 + 2x(1{,}01)^{-12} + 30\,000\,(1{,}01)^{-24}$ k

$x(2{,}900\ ...) = 67\,105{,}62$

x = R23 136,62 k

Marks: 0,03 k
0,01 k
equation k
months k
quart k

[14]

QUESTION / *VRAAG* 13

13.1 **$50\,000 = 190\,734{,}86\,(1-i)^6$**

$i = 0{,}20$

$\therefore$ = 20% (4)

13.2 **$190\,734{,}86\,(1{,}07)^6$**

= R286 241,59 (4)

13.3.1 $(1 + i) = 1{,}01^{12}$ k

$i = 0{,}1268$ k $\cdot$ 12,68% k (4)

13.3.2 $F = \dfrac{4\,000\,(1{,}1\,268^{5} - 1)}{,1\,268}(1{,}1\,268)$ k k k k k

$= R29\,022{,}92$ k (10)

13.3.3 $265\,266{,}60 = \dfrac{x(1{,}01^{72} - 1)}{0{,}01}$ k k k form

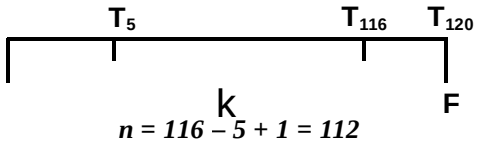
$x = R2\,533{,}35$ k

(Accept / *Aanvaar* 2 533,34) (12)

[34]

QUESTION / *VRAAG* 14

14.1



k

$n = 116 - 5 + 1 = 112$

$F = \dfrac{1\,000\,(1{,}005^{112} - 1)}{,005}(1{,}005)^{4}$ k k k k k

$= R152\,661{,}73$ k (14)

14.3 $152\,661{,}73 = 3\,000\dfrac{(1 - 1{,}0075^{-n})}{,0075}$ k - form

$-n = \dfrac{\log 0{,}6\,183\ldots}{\log 1{,}0075}$ k - logs

$n = 64{,}3\ldots$ k

$\therefore$ 64 + 1 last (12)

[26]

TOTAL FOR SECTION B / TOTAAL VIR AFDELING B: [100]

SECTION / *AFDELING* C
ANALYTICAL GEOMETRY / *ANALITIESE MEETKUNDE*

QUESTION / *VRAAG* 15

15.1 $l_1: x + y - 4 = 0$ $\qquad$ $l_2: x + 7y - 7 = 0$

$y = -x + 4$ $\qquad$ $7y = -x + 7$

$$\tan x = \frac{-1 - \left(\frac{-1}{7}\right)}{1 + (-1)\left(\frac{-1}{7}\right)} \qquad y = \frac{-1}{7}x + 1$$

$$= -3/4$$

$x = 180 + (-36,\ 87°)$

$= 143,13°$ (8)

15.2 $-x - y + 4 = 0$ (1)

$-x - 7y + 7 = 0$ (2)

$$\frac{-x - y + 4}{\sqrt{2}} = \frac{-x - 7y + 7}{\sqrt{50}}$$

$5(-x - y + 4) = -x - 7y + 7$

$-5x - 5y + 20 = -x - 7 + 7$

$-4x + 2y + 13 = 0$ (8)

[16]

QUESTION / *VRAAG* 16

16.1 $x^2 + y^2 - 8x - 4y = 0$ $\quad$ (1)

$x^2 + y^2 - 10x + 20 = 0$ $\quad$ (2)

$(2) - (1)\ -2x + 4y + 20 = 0$

$2y + 10 = x$ (4)

16.2 ***Subs t for / Subst. v ir x in (1)***

$(2y + 10)^2 + y^2 - 8(2y + 10) - 4y = 0$

$4y^2 + 40y + 100 + y^2 - 16y - 80 - 4y = 0$

$5y^2 + 20y + 20 - 0$

$y^2 + 4y + 4 = 0$

$(y+2)^2 = 0$

$y = -2$

$\therefore$ ***One point of inters ection only / Slegs ee n raakpunt***

$\therefore$ ***Common t ang ent / Gemee nskap like raa klyn*** (8)

[12]

QUES TION / *VRAAG* 17

17.1 $y^2 + 8x - 6y + 1 = 0$

$y^2 - 6y + 9 = -8x - 1 + 9$

$(y - 3)^2 = -8x + 8$

$= -8(x - 1)$

$= 4(-2)(x - 1)$ (8)

17.2.1 (1 ; 3) (2)

17.2.2 (-1 ; 3) (2)

17.2.3 $x = 3$ (2)

17.2.4 $|4(-1)|$

$= 4$ (2)

[16]

QUESTION / *VRAAG* 18

18.1 $9x^2 - 16y^2 + 54x - 32y = 79$

$9(x^2 + 6x) - 16(y^2 + 2y) = 79$

$9(x^2 + 6x + 9) - 16(y^2 + 2y + 1) = 79 + 81 - 16$

$9(x + 3)^2 - 16(y + 1)^2 = 144$

$\frac{9(x+3)^2}{144} - \frac{16(y+1)^2}{144} = 1$

$\frac{(x+3)^2}{16} - \frac{(y+1)^2}{9} = 1$ (10)

18.2 $\frac{x+3}{4} + \frac{y+1}{3} = 0$ $\frac{x+3}{4} - \frac{y+1}{3} = 0$

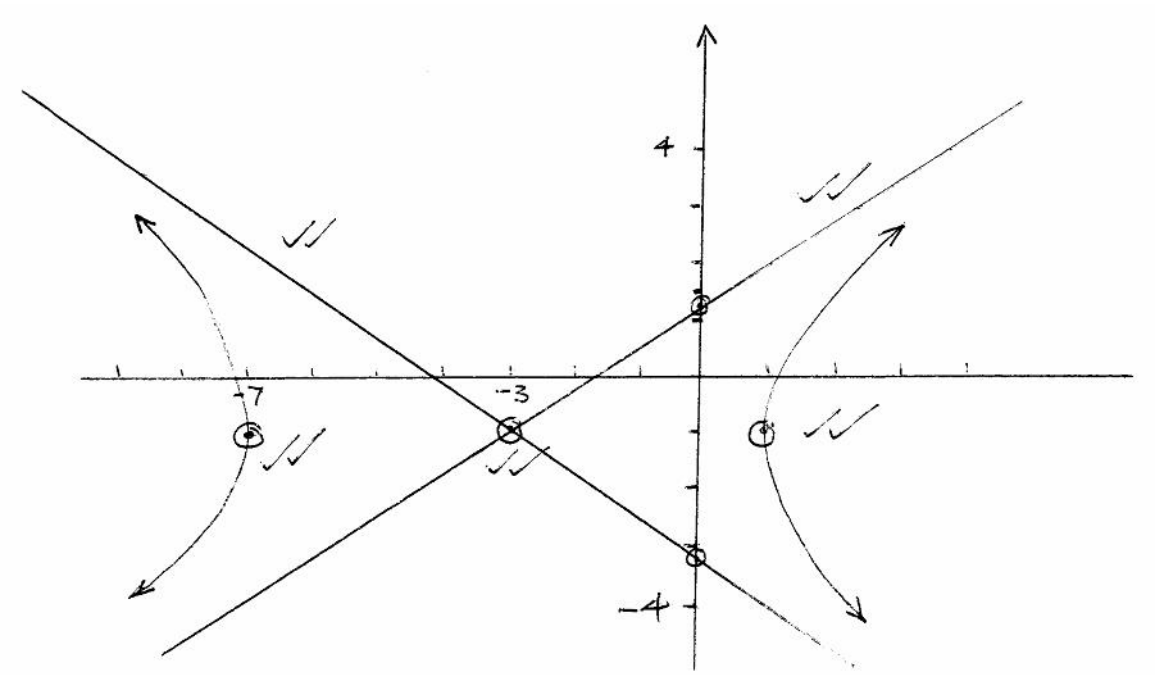
$3x + 9 + 4y + 4 = 0$ $3x + 9 - (4y + 4) = 0$

$3x + 4y + 13 = 0$ $3x + 4y + 5 = 0$

$4y = -3x - 13$ $4y = 3x - 5$

$y = \frac{-3x}{4} - \frac{13}{4}$ $y = \frac{3x}{4} + \frac{5}{4}$ (8)

18.3 Centre / *Middel* (-3; -1)
Vertices/ *Snypunte* (1; -1) (-7; -1)



(10)
[28]

QUESTION / *VRAAG* 19

19.1 $AC: a_1 = 1 \quad b_1 = 2 \quad c_1 = -1$

$BC: a_2 = 2 \quad b_2 = -1 \quad c_2 = -3$

$AC = \sqrt{1^2 + 2^2 + (-1)^2}$ $\qquad BC = \sqrt{2^2 + (-1)^2 + (-3)^2}$

$= \sqrt{6}$ $\qquad = \sqrt{14}$

$$\cos\theta = \frac{(1)(2) + (2)(-1) + (-1)(-3)}{\sqrt{6}.\sqrt{14}}$$

$$= \frac{2 + (-2) + 3}{\sqrt{84}}$$

$$= \frac{3}{\sqrt{84}}$$

$= 0,327$

$? = 70,9°$ (12)

19.2 $$Area/Opp. = \frac{1}{2}(AC)(BC)\sin ?$$

$$= \frac{1}{2}\sqrt{6}\sqrt{14}\sin 70,9°$$

$= 4,33$ (4)

19.3 *a, b & c are direction numbers of line l_1, normal to plane.*
a, b & c is rigtingno mmers vir lyn 1_1, normaal op vlak

(1) a + (2) b + (-1) c = 0 *i.e.* *a + 2b – c = 0 (1)*

(2) a + (-1) b + (-3) c = 0 *a – b – 3c = 0 (2)*

(1) – (2) 3b + 2c = 0

$$c = \frac{-3b}{2}$$

Sub in (1)

$$a + 2b - \frac{3b}{2} = 0$$

$$a = \frac{-b}{2}$$

If / As b = 2; a = -1; c = -3

-1(x-1) + 2(y – 0) + (-3) (Z-2) = 0

-x + 1 + 2y – 3Z + 6 = 0

-x + 2y – 3Z + 7 = 0 (12)

[28]

TOTAL FOR SECTION C / TOTAAL VIR AFDELING C: [100]

SECTION / *AFDELING* D

ALGEBRA

QUESTION / *VRAAG* 20

20.1 ***Let / Laat n = 1:***

LHS = ½ ***RHS*** = 1 - ½ = ½

∴ ***Statement true for / Stelling waar vir n = 1***

Assume statement true for / Aanvaar stelling waar n = k:

$$\frac{1}{2}+\frac{1}{2^2}+\frac{1}{2^3}+\ldots+\frac{1}{2^k}=1-\frac{1}{2^k}$$

Let / Laat n = k + 1

$$LHS = \frac{1}{2}+\frac{1}{2^2}+\frac{1}{2^3}+\ldots+\frac{1}{2^k}+\frac{1}{2^{k+1}}$$

$$= 1-\frac{1}{2^k}+\frac{1}{2^{k+1}}$$

$$= 1-\frac{1}{2^k}+\frac{1}{2}\cdot\frac{1}{2^k}$$

$$= 1-\frac{1}{2}\cdot\frac{1}{2^k}$$

$$= 1-\frac{1}{2^{k+1}} = RHS$$

∴ ***If statement is true for n = k, it is also true for n = k+1.***
As stelling waar is vir n = k, is dit ook waar vir n = k + 1

∴ ***True / Waar V*** $n \in N$. (16)

20.2 $\dfrac{4}{(x^2+2)(x^2+1)} = \dfrac{Ax+B}{x^2+2} + \dfrac{Cx+D}{x^2+1}$ k

$4=(Ax+B)(x^2+1)+(Cx+D)(x^2+2)$ k

$x^3: 0 = A + C$ ... j k

$x^2: 0 = B + D$ ... k k

$x: 0 = A + 2C$ ... l k

$C: 4 = B + 2D$ ... m k

m - k : $4 = D \cdot B = -4$ k

l - j : $C = 0 \cdot A = 0$ k

$\therefore \dfrac{-4}{x^2+2} + \dfrac{4}{x^2+1}$ (16)

20.3 $a + b + c = 3$ k

$ab + ac + bc = 2$ k

$abc = 1$

$(a + b + c)(a + b + c)$

$= a^2 + ab + ac + ab + b^2 + bc + ac + bc + c^2$ k

$\therefore a^2 + b^2 + c^2 = (a + b + c)^2 - 2(ab + ac + bc)$ k

$= 9 - 2.2$ k

$= 5$ k (14)

[46]

QUESTION / *VRAAG* 21

21.1 If there is a polynomial / *Indien daar ? polinoom* $P(x) \in \mathbf{Z[x]}$ k *is* / and there exists a prime number p such that / *en daar ? priemgetal* p *bestaan sodat*

(i) the main coefficient is not divisible by p / ***die hoofkoëffisiënt nie deur p deelbaar is nie.*** k

(ii) all other coefficients are divisible by p / ***al die ander koëffisiënte deelbaar is deur p*** k

(iii) the constant is not divisible by p^2 then $P(x)$ is irreducible in $Q[x]$ {or $Z[x]$} / ***is die konstante nie deelbaar deur p² nie en dan is P(x) onontbindbaar in Q[x] {of Z[x]}*** k (8)

21.2 Let / *Laat* $p = 3$: k

- 1 not div. by 3 / *1 is nie deur 3*
- 6, 18, 12 div. by 3 / *6, 18, 12 . deur 3*
- 12 not div by 3^2 / *12 nie deelbaar deur* 3^2

} m

$\therefore$ irreducible in $Z[x]$ / *onontbindbaar deur* $Z[x]$ k (8)

21.3 $1 + \sqrt{2}$ also a zero / *ook ? nul* k

$(x - 1 + \sqrt{2})(x - 1 - \sqrt{2})$ k a factor / *? faktor*

$= x^2 - 2x - 1$ k

$$
\begin{array}{r|l}
 & 1\ -1\ -5\ \ 5 \\
\hline
1\ -2\ -1 & 1\ -3\ -4\ 16\ -5\ -5 \\
 & \underline{1\ -2\ -1} \\
 & \ \ -1\ -3\ \ 16 \\
 & \underline{-1\ \ 2\ \ \ 1} \quad \text{k} \\
 & \ \ \ \ -5\ \ 15\ -5 \\
 & \ \ \ \ \underline{-5\ \ 10\ \ 5} \\
 & \ \ \ \ \ \ \ 5\ -10\ -5 \\
 & \ \ \ \ \ \ \ \underline{5\ -10\ -5}
\end{array}
$$

k k

$f(x) = (x^2 - 2x - 1)(x^3 - x^2 - 5x + 5) = (x^2 - 2x - 1)(x^2 - 5)(x + 1)$

$= (x - 1 + \sqrt{2})(x - 1 - \sqrt{2})(x - \sqrt{5})(x + \sqrt{5})(x - 1)$ (18)

k k k

[34]

QUESTION / *VRAAG* 22

22.1 $x^2 - 4x - 5 = 0$

$(x - 5)(x + 1) = 0$ k

$x = 5$ **or / of** $x = -1$ k

$y = 5$ k (6)

22.2 Vertical / *Vertikaal*: x = ½ k

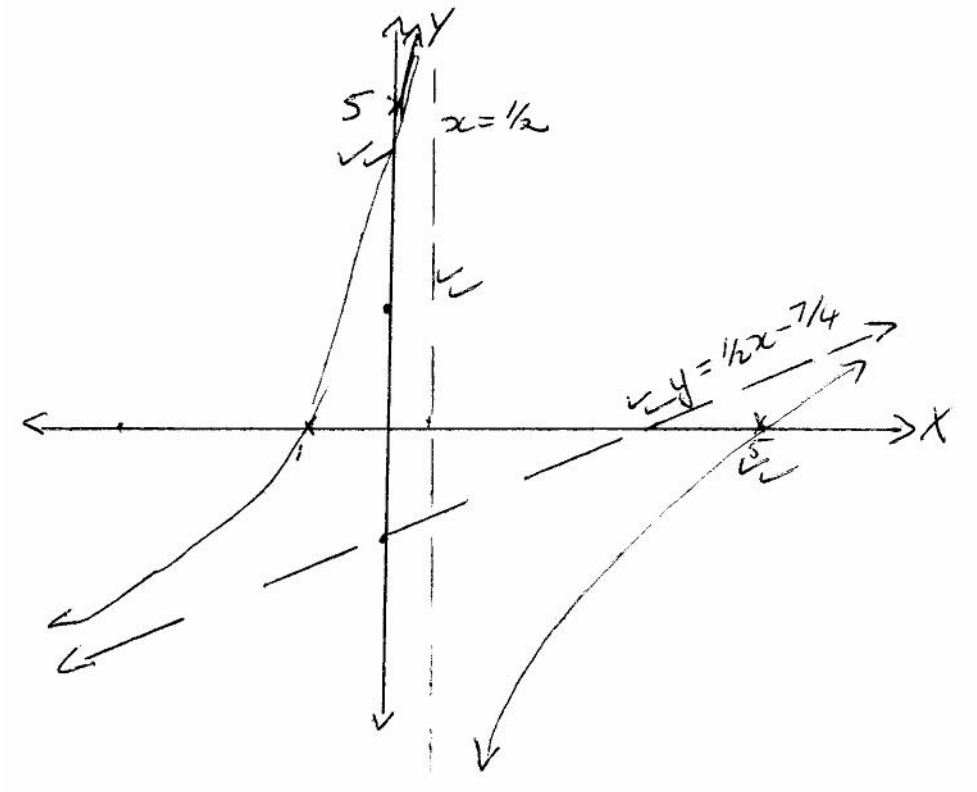
Horisontal: none / *Horisontaal: geen*

Oblique / *Skuins*: ½ $-\frac{7}{4}$

$$
\begin{array}{r|l}
 & 1\ \ -4\ \ -5 \\
\hline
2\ -1 & \\
 & \underline{1\ \ -½} \\
 & \ \ -3½\ \ -5 \\
 & \ \ -\ 3½\ \ {}^{+}\frac{7}{4}
\end{array}
$$

$\therefore$ $= ½x - \frac{7}{4}$ k k (6)

22.3



(8)

[20]

TOTAL FOR SECTION D / *TOTAAL VIR AFDELING D:* [100]

SECTION / *AFDELING* E
STATISTICS / *STATISTIEK*
QUESTION / *VRAAG* 23

23.1.1 $18^3 = 5\ 832$ k (4)

23.1.2 $k.k.k.\binom{16}{6} = 2450448$ or ${}^{18}P_2.{}^{16}C_6$ or ${}^{18}C_6.{}^{16}P_2$ (6)

23.2 $k.k.\binom{14}{2} = 182k$ (6)

[16]

QUESTION / *VRAAG* 24

$P(A).P(B) = P(A \cap B)$ k
$P(A) = 2P(B)$
$\therefore P(A \cup B) = 0{,}625$
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ k
$0{,}625 = 2P(B) + P(B) - 2P(B) \cdot P(B)$ k
$2P(B))^2 - 3P(B) + 0{,}625 = 0$ k — *or* $16(P(B))^2 - 24\,P(B) + 5 = 0$
k $(2P(B) - 2{,}5)(P(B) - 0{,}25) = 0$ k — $(4\,P(B) - 1)(4\,P(B) - 5) = 0$
$P(B) = 0{,}25$ k — $P(B) = ¼$
$P(A) = 0{,}5$ k — $P(A) = ½$ (16)

[16]

QUESTION / *VRAAG* 25

25.1 $\binom{6}{2}^{k} 0{,}15^2 \cdot 0{,}85^4 = 0{,}1762$ k k (8)

25.2 $P(X \geq 2) = 1 - P(X = 0{,}1)$ k

$= 1 - \binom{6}{0} 0{,}15^2 \cdot 0{,}85^6 - \binom{6}{1} 0{,}15 \cdot 0{,}85^5$ k

$= 0{,}2235$ k (8)

[16]

QUESTION / *VRAAG* 26

26.1 $\int_0^6 a(6 - x)\,dx = 1$ k

$(6ax - ½ax^2) \Big|_0^6 = 1$ k

$36a - 18a = 1$

$18a = 1$

$a = \frac{1}{18}$ k (10)

26.2 $\int_0^m \frac{1}{18}(6-x)dx = 0,5$ k

$\left(\frac{x}{3} - \frac{x^2}{36}\right)\Big|_0^m = 0,5$

$12m - m^2 = 18$ k

$m^2 - 12m + 18 = 0$

$m = \frac{12 \pm \sqrt{72}}{2}$ k

$m = \begin{matrix}10,2 \\ \text{n.a.}\end{matrix}$ **or /** ***of*** $m = 1,7574$ k

(12)

[22]

QUESTION / *VRAAG* 27

P(X < 240) + P(X > 260)

= P(Z < -1,67) + P(Z > 1,67) k k

= 2(0,5 – 0,4525) k k

= 0,095

∴ 0,095* x *100* = *10 pac kets / pakk ies k

(14)

[14]

QUESTION / *VRAAG* 28

28.1 $2,33\sqrt{\frac{0,53 \cdot 0,47}{n}} < 0,05$ k k

$n > 540,9$ k

∴ 541 people / mense k

(10)

28.2 $2,33\sqrt{\frac{0,53 \cdot 0,47}{2\,000}}$ k

$= 0,0260$ k

$= 2,6\ \%$ k

(6)

[16]

TOTAL FOR SECTION E / *TOTAAL VIR AFDELING E:* [100]

TOTAL / TOTAAL: 400