GAUTENG DEPARTMENT OF EDUCATION
GAUTENG DEPARTEMENT VAN ONDERWYS

SENIOR CERTIFICATE EXAMINATION
SENIORSERTIFIKAAT-EKSAMEN

ADDITIONAL MATHEMATICS HG
ADDISIONELE WISKUNDE

POSSIBLE ANSWERS OCT / NOV 2006

SECTION / *AFDELING* A
VERPLIGTEND
CALCULUS

QUESTION / *VRAAG* 1

1.1.1 $\theta = \frac{3\pi}{2} \div 3 = \pi/2$ k (2)

1.1.2 On / $Op = \frac{1}{2}r^2\theta$

$= \frac{1}{2}.9.p/4 = \frac{9p}{8}$ k (2)

1.1.3 On / $Op\Delta = \frac{1}{2}r^2 \sin\theta$

$= \frac{1}{2}r^2 \sin\pi/2$ k

$= \frac{1}{2}r^2 = 4{,}5$ k

$\therefore$ On shaded part / *Op gesk. deel* $= \frac{9\pi}{4} - 4{,}5$

˜ 2,57 (6)

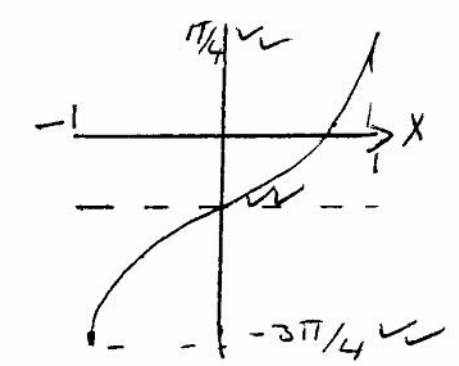
[10]

QUESTION / *VRAAG* 2

2.1.1 $-\frac{p}{2} \le \text{arcsin / } bg\ sin\ x \le p/_2$ k

$\therefore -\frac{3\pi}{4} \le \text{arcsin / } bg\ sin\ x - \pi/_4 \le \pi/_4$ k (4)

2.1.2



(6)

2.2.1 $\text{arc sin / bg sin}\left(-\cos\pi/_6\right)$ k

$= \text{arc sin / bg sin}\left(-\sqrt{3}/_2\right)$ k

$= -\pi/_3$ k (6)

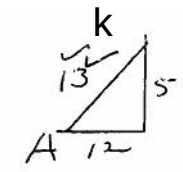
2.2.2 $\text{arc cos / bg cos}\left(-\sin\pi/_6\right)$ k

$= \text{arc cos / bg cos}\left(-1/_2\right)$ k

$= \pi - \pi/_3$ k

$= 2\pi/_3$ k (8)

2.2.3 Set $\text{arc tan / Stel bg tan } \frac{5}{12} = A$



$\therefore \tan A = \frac{5}{12}$ k

$\cos 2A$ k

$= \cos^2 A - \sin^2 A$ k

$= \frac{144}{169} - \frac{25}{169}$ k

$= \frac{119}{169}$ k (10)

[34]

QUESTION / *VRAAG* 3

3.1 $\lim\limits_{x \to 0^-} f(x) = 2$ k $\quad \lim\limits_{x \to 0^+} f(x) = |-2| = 2$ k

$f(o) = 3$ k

$\therefore$ Discontinue: removable / *Diskontinu: verwyderbaar* k (8)

3.2 *No, because discontinuous* / Nee, want nie kontinu nie k (2)

3.3 $f(x) = x - 2$ **if / *as*** $x = 2$

$-x + 2$ **if / *as*** $0 < x < 2$ k

$\lim\limits_{x \to 2^-} f(x) = -1$ k **and / *en*** $\lim\limits_{x \to 2^+} f'(x) = 1$ k

$\therefore$ **Not diff. at $x = 2$. / *Nie diff.baar by $x = 2$ nie.*** k (8)

[18]

QUESTION / *VRAAG* 4

4.1 $\lim\limits_{x \to 0} \dfrac{1 - \cos x}{x^2} \cdot \dfrac{1 + \cos x}{1 + \cos x}$ k $\quad \left(\dfrac{0}{0}, \therefore \text{L'H}\right)$

$= \lim\limits_{x \to 0} \dfrac{1 - \cos^2 x}{x^2(1 + \cos x)}$ k or / *of* $\lim\limits_{x \to 0} \dfrac{\sin x}{2x}$ k $\left(\dfrac{0}{0}, \therefore \text{L'H}\right)$

$= \lim\limits_{x \to 0} \dfrac{\sin^2 x}{x^2(1 + \cos x)}$ k $\quad = \lim\limits_{x \to 0} \dfrac{\cos x}{2}$ k

$= ½$ k $\quad = ½$ k (8)

4.2 $\lim\limits_{x \to \infty} \dfrac{x\sqrt{9 - \frac{3}{x} + \frac{2}{x^2}}}{x(6 - 5/x)}$ k k

$= \frac{1}{3}$ k (6)

[14]

QUESTION / *VRAAG* 5

$? x_i = \frac{2}{n}$ k

$x_i = \frac{2i}{n}$ k

$f(x_i) = 2\left(\frac{2i}{n}\right)^2 + 1$ k

$= \frac{8i^2}{n^2} + 1$ k

$f(x_i) . ? x_i = \frac{16i^2}{n^3} + \frac{2}{n}$ k

$\sum_{i=1}^{n} f(x_i) . ?x_i = \sum_{i=1}^{n}\left(\frac{16i^2}{n^3} + \frac{2}{n}\right)$ k

$= \frac{16}{n^3} . \frac{n}{6}(n+1)(2n+1) + \frac{2}{n} . n$ k

$\lim_{n \to \infty} \sum_{i=1}^{n} f(x_i) ? x_i = \frac{8}{3} . 2 + 2$

$= 7\frac{1}{3}$ k (18)

[18]

QUESTION / *VRAAG* 6

6.1 $f'(x) = \frac{\cos x . \cos x - \sin x . - \sin x}{\cos^2 x}$ k

$= \frac{\cos^2 x + \sin^2 x}{\cos^2 x}$ k

$= \frac{1}{\cos^2 x}$ k

$= \sec^2 x$ k (8)

6.2.1 $f'(x) = \dfrac{\sec^2 x.\sec^2 x - \tan x.2\sec x.\sec x\tan x}{\sec^4 x}$ k k

$f'\left(\pi/6\right) = \dfrac{\sec^4(\pi/6) - 2\tan^2(\pi/6)\sec^2 \pi/6}{\sec^4(\pi/6)}$ k

$= 1 - \dfrac{2.1/3}{4/3}$ k

$= ½$ k (12)

OR / *OF*

$f(x) = \tan x . \cos^2 x$ k

$f'(x) = \sec^2 x . \cos^2 x + \tan x . 2\cos x . -\sin x$

$f'\left(\pi/6\right) = 1 + -2\sin^2(\pi/6)$ k

$= 1 - 2\ (¼)$ k

$= ½$ k

6.2.2 $\dfrac{dy}{dx} = 3(\arccos / bg\cos(2x+1))^2 . \dfrac{1}{\sqrt{1 - (2x+1)^2}} .2$ k k k (6)

6.3 $f'(x) = 3(1+x^2)^2 . 2x$ k

$f''(x) = 6[2(1+x^2) . 2x . x + (1 + x^2)^2 . 1]$ k k

$= 6[(1+x^2)(4x^2 + 1 + x^2)]$ k

$= 6(1+x^2)(5x^2 + 1)$ (10)

[36]

QUESTION / *VRAAG* 7

7.1 $\int_2^6 3(2x-3)^{-1/2}\,dx$ k

$= \dfrac{3(2x-3)^{1/2}.2}{2}\Big|_2^6$ k

$= 3\left[\sqrt{2.6-3} - \sqrt{2.2-3}\right]$ k

$= 3\left(\sqrt{9} - 1\right)$

$= 6$ k (10)

7.2 $-\frac{1}{2}\int[\cos(4x-1)-\cos(-2x+3)]dx$ k

$= -\frac{1}{2}\left[\sin(4x-1).\frac{1}{4}-\sin(-2x+3).-\frac{1}{2}\right]+k$ k k (10)

[20]

QUESTION / *VRAAG* 8

8.1 $g'(x)=-\left(1+x^2\right)^{-2}.2x-\frac{1}{1+x^2}$ k k k

$= \frac{-2x-1-x^2}{\left(1+x^2\right)^2}$ k

$= \frac{-(x+1)^2}{\left(1+x^2\right)^2}$ k (10)

8.2 $A_0 = 1$

$A_1 = 0{,}7146$ k

$A_2 = 0{,}7468$ k

$A_3 = 0{,}7472$

$A_4 = 0{,}7472$ k

$\therefore x = 0{,}747$ k (8)

[18]

QUESTION / *VRAAG* 9

9.1 $L = \int_0^{3/2} \sqrt{1 + \left(x^{1/2}\right)^2}.dx$ k $\qquad f'(x) = x^{1/2}$

$= (1+x)^{3/2}.\frac{2}{3}\Big|_0^{3/2}$ k

$= \frac{2}{3}\left[\left(1+\frac{3}{2}\right)^{3/2} - (1+0)^{3/2}\right]$ k

$= \frac{2}{3}\left[2{,}5^{3/2} - 1\right]$ k

$= 1{,}969$ k (12)

9.2.1 $f\left(\frac{3}{2}\right) = \frac{2}{3}\left(\frac{3}{2}\right)^{3/2}$ k

Circum. / *Omtrek* = $\frac{3}{2}$ k + 1,969 + 1,225

$= 4{,}694$ k (6)

9.2.2 $V = \pi \int_0^{3/2} [f'(x)]^2 dx - \pi \int_0^{3/2} (f(x))^2 dx$ k

$= \pi \int_0^{3/2} \left(x^{1/2}\right)^2 dx - \pi \int_0^{3/2} \frac{4}{9} x^3 dx$ k

$= \pi\left[\frac{1}{2}x^2 . - \frac{1}{9}x^4\right]\Big|_0^{3/2}$ k

$= p\ (0{,}5625)$

$= 1{,}767$ k (14)

[32]

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

SECTION / *AFDELING* B
QUESTION / *VRAAG* 10

10.1.1 $C'(x) = \dfrac{(400x + 150)(x + 1) - (200x^2 + 150x + 80)1}{(x + 1)^2}$ k k k (6)

10.1.2 $C'(10) = \dfrac{(400.10 + 150)(10 + 1) - (200.10^2 + 150.10 + 80)}{(10 + 1)^2}$ k

$= R198,93$ k (4)

10.2 $\dfrac{C(10) - C(0)}{10}$ k k

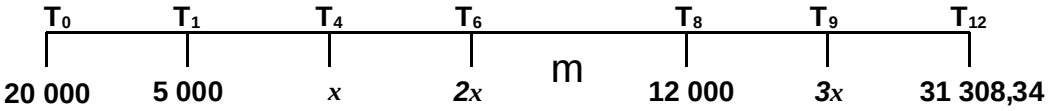
$= \dfrac{1961,82 - 80}{10}$ k

$= R188,18$ k (8)

[18]

QUESTION / *VRAAG* 11

11.1



(4)

11.2 T_{10}: $31\,308,34 + 3x\,(1,01125)^3 + x\,(1,01125)^8 = 12\,000\,(1,01125)^4 + 2x(1,01125)^6 + 5\,000\,(1,01225)^{11} + 20\,000\,(1,01125)^{12}$

x = R2 000,00

Points / *Punte*: $i = 0,01125$ k

right time / *regte tyd* k

equation cor. / *vergelyking reg* k

comb. form / *saamg: formule* k

answ. / *antw.* k

months / *maande* k (12)

[16]

QUESTION / *VRAAG* 12

12.1 $(1,03) = (1 + i)^3$ k

$i = 0,0099...$ k (6)

12.2 $F = \frac{1\,000(1,0099^{120}... - 1)}{,0099...}(1,0099) = 228424.70(1,0099)$ k k k

$= R230\,686,10$ k (12)

[18]

QUESTION / *VRAAG* 13

13.1 $350\,000 = x\left(1 - \left(\frac{16}{1\,200} + 1\right)^{-240}\right)\frac{16}{1\,200}$ k k k

form/vorm $\frac{16}{1\,200} = 0,013$

$x = R4\,869,40$ k

OR/ *OF*

$350\,000 = x(1,013)^{-1}\left(\frac{1 - 1,013^{-240}}{1 - 1,013^{-1}}\right)$

$= R4\,869,40$ (12)

13.2 $UB = 350\,000(1,013)^{120} - \frac{4\,869.40(1,013^{120} - 1)}{,013}$ k k k

$= R290\,686,16$ k *(290 687,42 – exact valve of x) / presiese waar de van x*

OR / OF

$UB = \frac{4\,869,40(1 - 1,013^{-120})}{,013}$

$= R290\,687,68$

(290 687,42 – exact / presies) (12)

13.3 $290\,700 = \frac{20\,000(1 - 1{,}0375^{-n})}{,0375}$ k form

$n = \frac{\log 0{,}4549375}{\log 1{,}0375}$ k : logs

$n = 21 + 1$ last / laaste k (14)

13.4 $290\,688(1{,}0375)^{22} - \frac{20\,000(1{,}0375^{21} - 1)(1{,}0375)}{,0375}$

= R7 939,45

OR

$290\,700\,(1{,}0375)^{22} - \frac{20\,000\,(1{,}0375^{-21} - 1)}{,0375}(1{,}0375)$ k form

= R7 966,42 k (10)

[48]

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

SECTION / *AFDELING* C

QUESTION / *VRAAG* 14

ANALITIESE MEETKUNDE

14.1 $(x+2)^2 + (y-1)^2 = 16$ en $(x-2)^2 + (y-4)^2 = 9$

$\therefore x^2+4x+4+y^2-2y+1 = 16$ $\quad\therefore x^2-4x+4+y^2-8y+16 = 9$

$\therefore x^2+4x+y^2-2y-11=0$ (1) $\quad\therefore x^2-4x+y^2-8y+11=0$ (2)

(1) – (2): $8x+6y-22 = 0$

$\therefore$ Equation of common chord / Vgl. van gemeenskap like koord: $4x-3y-11=0$ (3) (6)

14.2 From / *Uit (3):* $y = \frac{11-4x}{3}$ *and state (substitute) in / en stel in (1).*

$\therefore\ x^2+4x+\left(\frac{11-4x}{3}\right)^2-2\left(\frac{11-4x}{3}\right)-11=0$

$\therefore\ 25x^2-28x-44=0$

$\therefore\ (25x+22)(x-2)=0$

$\therefore\ x=\frac{-22}{25}$ *of* $x = 2$

$y=\frac{121}{25}$ *of* $y = 1$

$\therefore$ *points of intersection / snypunte:* $(2;1)$ *and / en* $\left(\frac{-22}{25};\frac{121}{25}\right)$

$\therefore$ *Length / Lengte* $=\sqrt{\left(2+\frac{22}{25}\right)^2+\left(1-\frac{121}{25}\right)^2}$

$=\sqrt{\frac{14\,400}{625}}$

$=\frac{120}{25}$

$= 4{,}8$ *units / eenhede* (18)

[24]

QUESTION / *VRAAG* 15

15.1 *Distance from / Afstand van P(x;y) to axis / na riglyn* $x = -a$ *is* $x-(-a)=x+a$

Distance from / Afstand van P to focus /na fokus $(a;o)$ *is* $\sqrt{y^2+(x-a)^2}$

Acc. def of parabola / Volgens def. van parabool: $x+a=\sqrt{y^2+(x-a)^2}$

$\therefore (x+a)^2=y^2+(x-a)^2$

$\therefore y^2=(x+a)^2-(x-a)^2$

$= x^2+2ax+a^2-x^2+2ax-a^2$

$= 4ax$ (8)

15.2 $y = 4(½)x\ \therefore\ y = 2x$ (2)

15.3 $y^2 = 16x = 4(4)x \therefore a = 4$

Equa of tangen t at / Vgl. van raaklyn by (1; 4) is $4y = 8(x+1)$

$\therefore 4y = 8x + 8$

$\therefore y = 2x + 2$

Normal / Normaal $m = -½$

$\therefore$ *Vgl:* $y - 4 = -½ (x-1)$

$\therefore 2y - 8 = -x + 1$

$\therefore 2y = -x + 9$ (12)

[22]

QUESTION / *VRAAG* 16

16.1 $\overrightarrow{AB} = [-4;2;4]$ *and / en* $\overrightarrow{DC} = [-4;2;4]$

Beca use / Omdat $\overrightarrow{AB} = \overrightarrow{DC}$ *is ABC D a / ? par allelogra m and / en*

$\left[\overrightarrow{AB}\right] = \sqrt{(-4)^2 + 2^2 + 4^2} - \sqrt{36} = 6$ *and / en*

$\left[\overrightarrow{AD}\right] = \sqrt{(-4)^2 + (-4)^2 + (-2)^2} - \sqrt{36} = 6$

$\therefore$ *Adjac ent sides are equ al / Aangr ense nde sye is gelyk*

$\therefore$ *ABC D is a rhombus / ? ruit*

and / en $\overrightarrow{AB} . \overrightarrow{AD} = [-4,2,4][-4,-4,-2]$

$= 16-8-8$

$= 0$

$\therefore \overrightarrow{AB}$ *perpe ndicular on / is loodreg op* $\overrightarrow{AD}$

$\therefore$ *ABC D isa sq uare / ? v ierkan t.* (14)

16.2 *Point / Punt P(1; 9; 6) and normal / en normaal [1; -2, 2]*

$\therefore x = 1 + t;\ y = 9 - 2t;\ z = 6 + 2t$ (6)

16.3 *Line 1 intersects lev el P, where / Lyn l sny die vlak P, waar*

$(1 + t) - 2(9 - 2t) + 2(6 + 2t) = 4$

$\therefore 1 + t - 18 + 4t + 12 + 4t = 4$

$\therefore 9t = 9$

$\therefore t = 1$

$\therefore$ *Q is the poin t / die punt (2, 7, 8)* (6)

[26]

QUESTION / *VRAAG* 17

17.1 ***A(1, 0, 3) and / en B(0, -1, 4)*** $\therefore \overrightarrow{AB} = [-1, -1, 1]$

$\therefore x = 1 - t, y = -t, z = 3 + t$ (6)

17.2 ***Lines intersect where / Lyne sny waar***

$1 - t = 2 + S$, $-t = 1 + 2S$, $3 + t = 3 + S$

$\therefore 1 - t = 2 + t$ $\therefore -t = 1 + 2t$ $\therefore t = D$

$\therefore -1 = 2t$ $\therefore -1 = 3t$

$\therefore -\frac{1}{2} = t$ $\therefore -\frac{1}{3} = t$

$\therefore$ ***No point of intersection / Geen snypunt nie!*** (14)

17.3 ***Distance from / Afstand van A(1 , 0, 3) to the level / na die vlak 3x – 2y + x = 7***

$$= \left| \frac{3(1) - 2(0) + 3 - 7}{\sqrt{3^2 + (-2)^2 + 1^2}} \right|$$

$$= \left| \frac{-1}{\sqrt{14}} \right| = \frac{1}{\sqrt{14}}$$ (6)

17.4 It is the distance between the two lines. / *Dit is die afstand tussen die twee lyne.* (2)

[28]

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

SECTION / *AFDELING* D
QUESTION / *VRAAG* 18
ALGEBRA

18.1 $\frac{11x^2+3x-1}{2x^3+x^2} = \frac{11x^2+3x-1}{x^2(2x+1)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{2x+1}$ k

$\therefore 11x^2 + 3x - 1 = A\,x(2x + 1) + B(2x + 1) + Cx^2$ k

Set / Stel $x = 0$ $\quad \therefore -1 = B \quad \therefore B = -1$ k

Set / Stel $x = -½$ $\quad \therefore 11(-½)^2 + 3(-½) - 1 = C(-½)^2$ k

$$\therefore +\frac{11}{4} - \frac{3}{2} - 1 = \frac{C}{4}$$

$\therefore 11 - 6 - 4 = C = 1$ k

and / en $11 = 2A + C \quad \therefore 2A = 10 \quad \therefore A = 5$ k

$\therefore \frac{5}{x} + \frac{-1}{x^2} + \frac{1}{2x+1}$ k (14)

18.2 $a + b + c = -12$

$ab + ac + bc = 4$ k

$abc = 6$

$\frac{abc}{6} = 1$ k

$\frac{a+b+c}{ab+ac+bc} = -\frac{12}{4} = -3$ k

$\therefore$ *sum / som:* $1 - 3 - 3 = -5$ k

S/p: $1.-3 + 1.-3 + -3.-3 = 3$ k

product / produk : $1.-3.-3 = 9$ k

$\therefore x^3 + 5x^2 + 3x - 9$ k (14)

[48]

18.3 ***Prove that / Bewys dat*** $\sum_{k=1}^{n} k.\log x = \frac{n}{2}\log x^{n+1}$

(i) ***For / <u>Vir n = 1</u>: LK = log x and / en RK = ½ log x2*** k

$\therefore$ ***LK = RK*** ***= ½ . 2 log x***

= log x k

(ii) ***For / <u>Vir n = k</u>: Assume the statement is trufe for n = k d.i. .***
Veronderstel die bewering is waar vir n = k d.i.

$\log x + 2\log x + 3\log x \ldots + k.\log x = \frac{k}{2}\log x^{k+1}$ k

(iii) ***<u>Vir n = k + 1</u>***:

$LS / LK = \underbrace{\log x + 2\log x + \ldots + k.\log x}_{k} + (k+1)\log x$

$= \frac{k}{2}\log x^{k+1} + (k+1)\log x$ k

$= \frac{k}{2}.(k+1)\log x + (k+1).\log x = (\frac{k}{2}+1)(k+1)\log x$

$= \frac{(k+2)(k+1)}{2}\log x$ k

and RS / *en RK* $= \frac{k+1}{2}\log x^{k+2}$ k

$= \frac{(k+1)}{2}(k+2)\log x$

$\therefore$ ***LS / LK = RS / RK***

(iv) ***Statement is true for / Bewering is waar vir n = k + 1 if it is true for / as dit waar is vir n = k***
$\therefore$ ***Where for all / Waar vir alle*** $n \in N$ **.** k (20)

QUESTION / *VRAAG* 19

19.1.1 ***HCF of / GGD van $x^4 - 5x^3 + yx^{hf} - 5x + 6$ and / en $x^3 + x^{2g} + x + 1$***

$$\begin{array}{r|l} & 1 \quad -6 \\ \hline 1\ 1\ 1\ 1 & 1\ -5\ +7\ -5\ +6 \\ & \underline{1\ \ 1\ \ 1\ \ 1} \\ & -6\ \ 6\ -6\ \ 6 \\ & \underline{-6\ -6\ -6\ -6} \\ & 12\ \ 0\ 12 \end{array} \quad \text{k}$$

$$\begin{array}{r|l} & \tfrac{1}{2}\ \tfrac{1}{2} \\ \hline 12\ \ 0\ \ 12 & 1\ \ 1\ \ 1\ \ 1 \\ & \underline{1\ \ 0\ \ 1} \\ & 1\ \ 0\ \ 1 \\ & \underline{1\ \ 0\ \ 1} \end{array} \quad \text{k}$$

or $x^2 + 1$

$\therefore$ ***HCF / GGD*** $= 12x^2 + 12$ (16)

19.1.2 $$f = (x-6)\left(\frac{x}{12} + \frac{1}{12}\right)(12x^2 + 12) + (12x^2 + 12) \quad \text{k}$$

$$= (12x^2 + 12)\left[(x-6)\left(\frac{x}{12} + \frac{1}{12}\right) + 1\right] \quad \text{k}$$

$$= (12x^2 + 12)\left(\frac{x^2}{12} + \frac{x}{12} - \frac{6x}{12} - \frac{6}{12} + 1\right) \quad \text{k}$$

$$= (x^2 + 1)(x2 + x - 6x - 6 + 12)$$

$$= (x^2 + 1)(x^2 - 5x + 6) \quad \text{k}$$

$$= (x^2 + 1)(x-3)(x-2) \quad \text{k}$$ (8)

OR / *OF*

$$\begin{array}{r|l} & 1 \quad -5 \quad 6 \\ \hline 1\ \ 0\ \ 1 & 1\ -5\ \ 7\ -5\ \ 6 \\ & \underline{1\ \ 0\ \ 1} \\ & -5\ \ 6\ -5 \\ & \underline{-5\ \ 0\ -5} \\ & 6\ \ 0\ \ 6 \end{array} \quad \text{k} \quad \text{k}$$

$\therefore$ ***f(x) = $(x^2 + 1)(x^2 - 5x + 6)$***

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

19.2 $-1-\sqrt{2}$ *also zero point / ook nulpunt* k

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

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

$$\begin{array}{r|rrrrr} & 1 & -4 & 1 & & \text{k} \\ \hline 1\ \ 2\ \ -1 & 1 & -2 & -8 & 6 & -1 \\ & \underline{1} & \underline{2} & \underline{-1} & & \\ & & -4 & -7 & 6 & \text{k} \\ & & \underline{-4} & \underline{-8} & \underline{4} & \\ & & & 1 & 2 & -1 \end{array}$$

$f(x)=(x^2+2x-1)(x^2-4x+1)$ k

$= (x+1+\sqrt{2})(x+1-\sqrt{2})(x-2-\sqrt{3})(x-2+\sqrt{3})$ k k

$x^2-4x=-1$

$(x-2)^2=3$ *or else / of anders*

$x=2\pm\sqrt{3}$ (18)

[34]

QUESTION / *VRAAG* 20

20.1 $f'(x)=\dfrac{5(x^2+5)-5x(2x)}{(x2+5)^2}$ k k

$= \dfrac{5x^2+25-10x^2}{(x^2+5)^2} = \dfrac{-5x^2+25}{(x^2+5)^2} = \dfrac{-5(x^2-5)}{(x^2+9)^2}$ (6)

20.2 *If / Stel* $f'(x)=0$

$\therefore \dfrac{-5(x^2-5)}{(x^2+5)^2}=0$ $\qquad \therefore x^2-5=0$ k

$\therefore x=\pm\sqrt{5}$ k

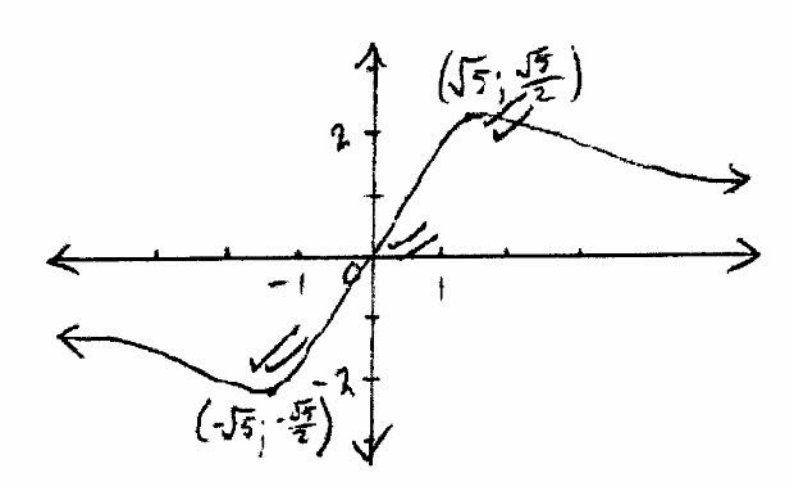
or / of ± 2,236

$\therefore f(-\sqrt{5})=\dfrac{-5\sqrt{5}}{10}$ *and / en* $\qquad f(\sqrt{5})=\dfrac{5\sqrt{5}}{10}$ k

$= \dfrac{-\sqrt{5}}{2}$ $\qquad = \dfrac{\sqrt{5}}{2}$

and / en $\left(-\sqrt{5};\dfrac{-\sqrt{5}}{2}\right)$ (8)

20.3



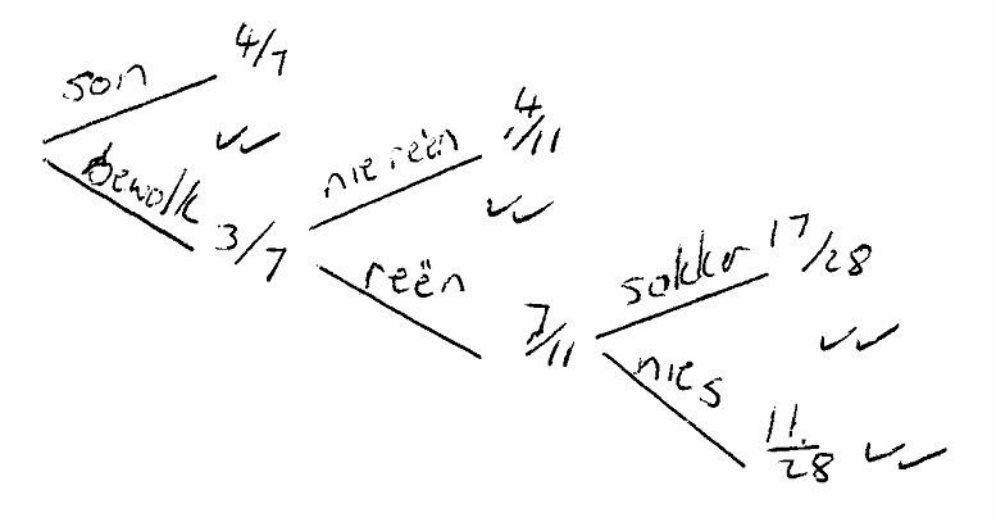
(6)
[20]

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

SECTION E / *AFDELING* E

QUESTION / *VRAAG* 21

21.1



(8)

21.2 ***P (soccer / sokker) = 1 – P (no soccer / nie sokker)***

$= \frac{3}{7} \times \frac{4}{11} \times \frac{17}{28} = 0,0946$

(6)
[14]

QUESTION / *VRAAG* 22

22.1 $\frac{6!}{3!} = 120$ k (6)

22.2 $\frac{5!}{2!} + \frac{5!}{3!} = 80$ k

$waarsk = \frac{80}{120} = \frac{2}{3} = 0,6667$ k (8)

[14]

QUESTION / *VRAAG* 23

23.1 $\binom{x}{2} = 45$

$\frac{x!}{2!(x-2)!} = 45$ k $\qquad x(x-1) = 90$ k

$x^2 - x - 90 = 0$ *any method / enige metode*

$(x-10)(x+9) = 0$ *could also "hit and miss" / kan ook "probeer en tref"*

$x = 10$ k (6)

23.2.1 $\binom{9}{5}\left(\frac{11}{20}\right)^5\left(\frac{9}{20}\right)^4 = 0,2600$ k k k (8)

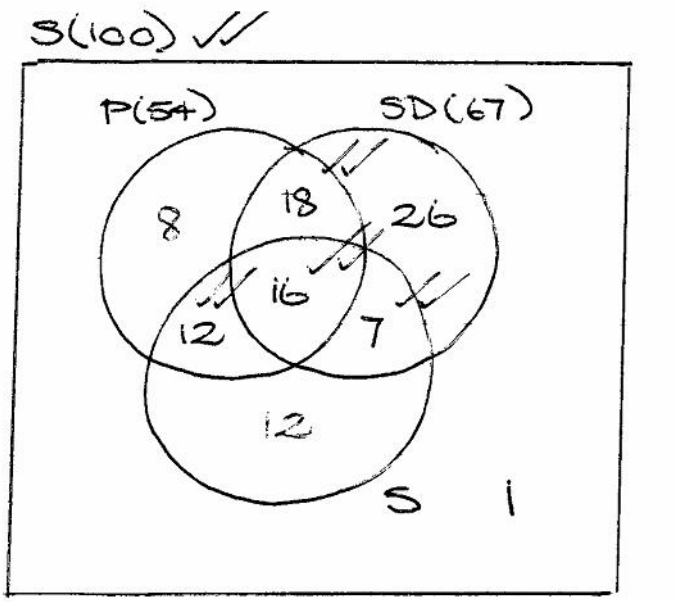
23.2.2 $\binom{11}{5}\binom{9}{4} = 0,3466$ k k k

$\binom{20}{9}$ k (8)

[22]

QUESTION / *VRAAG* 24

24.1



(10)

24.2.1 12% m (4)

[18]

QUESTION / *VRAAG* 25

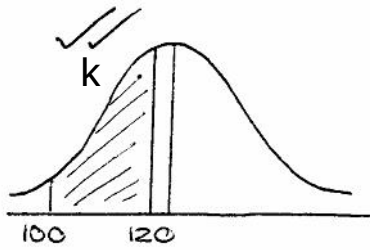
25.1 ***P(110 < x < 120)***

= P(-1,86 < Z < -0,43) k k

= P(0,43 < Z < 1,86)

= 0,4686 – 0,1664 k k

= 0,3022 k



(12)

25.2 ***P(X > h) = 0,0123***

∴ P(0 < Z < Z₁) = 0,4877 k

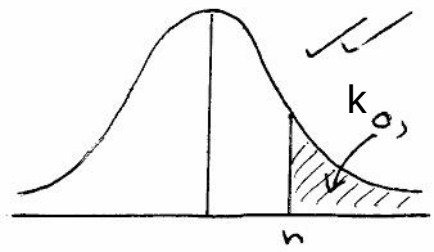
∴ Z₁ = 2,25 k

x = μ + zs

= 123 + 2,25 – 7 k

= 138,75

∴ n = 139 k



(10)

[22]

QUESTION / *VRAAG* 26

26.1 $P = \frac{44}{50}$ k

$= 0,88$ k (4)

26.2 ***96% conf. int. /-vertroue nsinterval***

$= \left(p \pm 2,05\sqrt{\frac{p(1-p)}{n}} \right)$ ***- correct formula / korrekte formule***

$= \left(0,88 \pm 2,05\sqrt{\frac{0,88(1-0,88)}{50}} \right)$ k

k k

$= (0,786; 0,974)$ (10)

[14]

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

TOTAL / TOTAAL: 400