α-MATHEMATICS

Alpha Wiskunde Graad 11 / *Alpha Mathematics Grade 11*

Kwartaal 3 Toets 2022 / *Term 3 Test 2022*

MEMORANDUM

Totaal / *Total*: 100 punte / *marks*

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Moderator: Anna Muller

Hierdie memorandum bestaan uit 6 bladsye. /
This memorandum consists of 6 pages.

Vraag / *Question* 1 **[20 punte / *marks*]**

1.1	A	**B**	C	D
1.2	A	B	C	**D**
1.3	A	B	**C**	D
1.4	**A**	B	C	D
1.5	A	**B**	C	D
1.6	A	B	**C**	D
1.7	A	B	**C**	D
1.8	**A**	B	C	D
1.9	**A**	B	C	D
1.10	A	**B**	C	D

Vraag / *Question* 2 **[25 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
2.1.1	$\lim_{x\to a^-} f(x) = a+1$✓ $\lim_{x\to a^+} f(x) = -2a^2+3a+5$✓ $f(x)$ is continous therefor: $a+1 = -2a^2+3a+5$✓ $0 = 2a^2-2a-4$ $0 = a^2-a-2$ $0 = (a-2)(a+1)$ $a = 2\ ;\ -1$✓✓	**(5)**
2.1.2	$f'(x) = \begin{cases} 1 & if \quad x \le 2 \\ -4x+3 & if \quad x < 2 \end{cases}$✓✓	**(2)**
2.1.3	$\lim_{x\to 2^-} f'(x) = 1$ ✓ $\lim_{x\to 2^+} f'(x) = -5$✓ $\lim_{x\to 2^-} f'(x) \neq \lim_{x\to 2^+} f'(x)$✓ f is not differentiable at $x = 2$	**(3)**
2.2.1	C & G✓✓	**(2)**
2.2.2	H✓✓	**(2)**
2.2.3	H & L✓✓	**(2)**
2.2.4	C & G✓✓	**(2)**
2.2.5	C, G✓, H, D✓, L & J✓	**(3)**
2.3	Domain: $x \in \mathbb{R}$✓ ; $x \neq H$✓ Range: $y \in \mathbb{R}$ ✓✓	**(4)**

Vraag / *Question* 3 **[20 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
3.1	$ab = (1; 3; -1)$ ✓ $vu = (-5; 0; -2)$✓	**(2)**
3.2	$\|ab\| = \sqrt{11}$✓ $\|vu\| = \sqrt{29}$✓.	**(2)**
3.3	$ab.vu = 1(-5) + 0(3) - 1(-2) = -3$✓.	**(1)**
3.4	$-3 = \sqrt{11}.\sqrt{29}.\cos\theta$ ✓ $\theta \approx 1{,}74\, rad$✓	**(2)**
3.5	$a \times b$✓ $= \begin{vmatrix} i & j & k \\ 3 & -1 & 2 \\ 4 & 2 & 1 \end{vmatrix}$ ✓ $= i\begin{vmatrix} -1 & 2 \\ 2 & 1 \end{vmatrix} - j\begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix} + k\begin{vmatrix} 3 & -1 \\ 4 & 2 \end{vmatrix}$ $= i(-1-4)$✓ $- j(3-8)$✓ $+ k(6+4)$✓ $= -5i$✓ $+ 5j$✓ $+ 10k$✓	**(8)**
3.6	$\|a \times b\| = \sqrt{25 + 25 + 100} = 12{,}25\ units^2$✓✓	**(2)**
3.7	$\|v\| = \sqrt{14}$✓ $\gamma = arc\cos\left(\frac{3}{\sqrt{14}}\right)$ ✓ $\approx 0{,}64$ rad	**(3)**

Vraag / *Question* 4 **[21 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
4.1	$f(x) = 10x^{15} - 3x + 2\sqrt{x} - 9 + \frac{4}{x}$ $f'(x) = 150x^{14}\checkmark - 3\checkmark + x^{-\frac{1}{2}}\checkmark - 4x^{-2}\checkmark$	**(4)**
4.2	$y = (x^2 - 2x)\left(x + \frac{1}{x}\right)$ $y' = (2x - 2)\checkmark\left(x + \frac{1}{x}\right)\checkmark + (x^2 - 2x)\checkmark(1 - x^{-2})\checkmark$	**(4)**
4.3	$h(t) = (5t^4 + 4t^3 - 3t^2 - 2t + 1)^3$ $h'(t) = 3\checkmark(5t^4 + 4t^3 - 3t^2 - 2t + 1)\checkmark^{2\checkmark}(20t^3\checkmark + 12t^2\checkmark - 6t\checkmark - 2)\checkmark$	**(7)**
4.4	$g(x) = \frac{3x^2-5}{2x+1}$ $g'(x) = \frac{6x(2x+1)\checkmark - (3x^2-5)(2)\checkmark}{(2x+1)^2\checkmark}$	**(3)**
4.5	$t(x) = \cot(1 - 9x)$ $t'(x) = 9\checkmark cosec^2\checkmark(1 - 9x)\checkmark$	**(3)**

Vraag / *Question* 5 **[19 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
5.1.1	$\int \frac{1}{\sqrt{81-25x^2}}dx$ $= \int \frac{1}{\sqrt{81\left(1-\frac{25}{81}x^2\right)}}dx$ ✓ $= \frac{1}{9}$ ✓ $\int \frac{1}{\sqrt{1-\left(\frac{5x}{9}\right)^2}}dx$ ✓ $= \frac{1}{9}\arcsin\left(\frac{5x}{9}\right).\frac{9}{5}+c$ ✓✓	**(5)**
5.1.2	$\int_{-1}^{2}(2-3x)^5\,dx$ $= \frac{(2-3x)^6}{6(-3)}\Big\vert_{-1}^{2}$ ✓✓ $= \frac{\left(2-3(2)\right)^6}{-18}$ ✓ $- \frac{\left(2-3(-1)\right)^6}{-18}$ ✓ $= \frac{1281}{2}$ ✓	**(5)**
5.2	$f'(x) = \int f''(x)dx$ $f'(x) = \frac{x^2}{2}+2x+c$ ✓ $0 = \frac{2^2}{2}+2(2)+c$ $c = -6$ $f'(x) = \frac{x^2}{2}+2x-6$ ✓ $f(x) = \int\left(\frac{x^2}{2}+2x-6\right)dx$ $f(x) = \frac{x^3}{6}+\frac{2x^2}{2}-6x+c$ ✓ $\frac{5}{6} = \frac{1}{6}+1-6+c$ $c = \frac{17}{3}$ $f(x) = \frac{x^3}{6}+\frac{2x^2}{2}-6x+\frac{17}{3}$ ✓	**(4)**

- EINDE VAN DIE MEMORANDUM / *END OF THE MEMORANDUM* -