DIFFERENSIAALREKENE

Oplossings

Die DBE se eie nasienriglyne, in boekvolgorde

Elke oplossing hier is 'n uitknipsel van die amptelike DBE-nasienriglyn wat saam met die vraestel gepubliseer is waaruit die vraag kom. Die bewerking, die punt-merke en die aanvaarde alternatiewe is die DBE se eie. Niks is oorgeskryf of oor afgelei nie.

Die nommers pas by die vraeboek: oplossing 34 antwoord vraag 34, en die hoofstukke is in dieselfde volgorde.

Die DBE skryf een riglyn vir albei tale, so hierdie bladsye is tweetalig en hul nasienaantekeninge is grootliks in Engels. Dit is die DBE se eie bladsy, presies soos gedruk weergegee.

'n Nasienriglyn word vir nasieners geskryf, nie vir leerders nie. Dit wys die kortste pad na die punte, so waar 'n stap saamgepers lyk, is dit die riglyn wat bondig is eerder as 'n stap wat ontbreek.

1. Eerste beginsels op min x kwadraat, dan twee met die reëls

Amptelike DBE-nasienriglyn · Mei/Junie 2022 · V8 · 11 punte

QUESTION/*VRAAG* 8

8.1	$f(x)=-x^2$ $f'(x)=\lim\limits_{h\to0}\dfrac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to0}\dfrac{-(x+h)^2+x^2}{h}$ $f'(x)=\lim\limits_{h\to0}\dfrac{-x^2-2xh-h^2+x^2}{h}$ $=\lim\limits_{h\to0}\dfrac{-2xh-h^2}{h}$ $=\lim\limits_{h\to0}\dfrac{h(-2x-h)}{h}$ $=\lim\limits_{h\to0}(-2x-h)$ $\therefore f'(x)=-2x$	✓ substitution into formula ✓ $-(x^2+2xh+h^2)$ ✓ $-2xh-h^2$ ✓ $-2x-h$ ✓answer (5)
	OR/*OF* $f(x)=-x^2$ $f(x+h)=-(x+h)^2=-x^2-2xh-h^2$ $f(x+h)-f(x)=-x^2-2xh-h^2-(-x^2)=-2xh-h^2$ $f'(x)=\lim\limits_{h\to0}\dfrac{f(x+h)-f(x)}{h}$ $=\lim\limits_{h\to0}\dfrac{-2xh-h^2}{h}$ $=\lim\limits_{h\to0}\dfrac{h(-2x-h)}{h}$ $=\lim\limits_{h\to0}(-2x-h)$ $\therefore f'(x)=-2x$	**OR/*OF*** ✓ $-x^2-2xh-h^2$ ✓ $-2xh-h^2$ ✓substitution into the formula ✓ $-2x-h$ ✓answer (5)
8.2.1	$f(x)=4x^3-5x^2$ $f'(x)=12x^2-10x$	✓ $12x^2$ (A) ✓ $-10x$ (A) (2)
8.2.2	$D_x\left[\dfrac{-6\sqrt[3]{x}+2}{x^4}\right]$ $=D_x\left[\dfrac{-6(x)^{\frac{1}{3}}}{x^4}+\dfrac{2}{x^4}\right]$ $=D_x\left[-6x^{-\frac{11}{3}}+2x^{-4}\right]$ $=22x^{-\frac{14}{3}}-8x^{-5}$	✓ $x^{\frac{1}{3}}$ ✓ $-6x^{-\frac{11}{3}}+2x^{-4}$ ✓ $22x^{-\frac{14}{3}}$ ✓ $-8x^{-5}$ (4)
		[11]

2. Eerste beginsels, dan om 'n produk van wortelvorms te differensieer

Amptelike DBE-nasienriglyn · Mei/Junie 2021 · V8 · 12 punte

QUESTION/*VRAAG* 8

8.1	$f(x)=3x^2$ $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{3(x+h)^2-3x^2}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{3x^2+6xh+3h^2-3x^2}{h}$ $=\lim\limits_{h\to 0}\dfrac{6xh+3h^2}{h}$ $=\lim\limits_{h\to 0}\dfrac{h(6x+3h)}{h}$ $=6x$	✓ substitution ✓ expansion ✓ simplification ✓ $\lim\limits_{h\to 0}\dfrac{h(6x+3h)}{h}$ ✓ $6x$ (5)
8.2.1	$f(x)=x^2-3+9x^{-2}$ $f'(x)=2x-18x^{-3}$	✓ $9x^{-2}$ ✓ $2x$ ✓ $-18x^{-3}$ (3)

8.2.2	$g(x)=(\sqrt{x}+3)(\sqrt{x}-1)$ $g(x)=x+2x^{\frac{1}{2}}-3$ $g'(x)=1+x^{-\frac{1}{2}}$	✓ x ✓ $2x^{\frac{1}{2}}$ ✓ 1 ✓ $x^{-\frac{1}{2}}$ (4)
		[12]

3. Eerste beginsels, dan dy/dx van 'n vierdegraadse en 'n wortelvorm

Amptelike DBE-nasienriglyn · November 2021 · V9 · 12 punte

QUESTION/VRAAG 9

9.1	$f^{/}(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f^{/}(x)=\lim_{h\to 0}\frac{2(x+h)^2-3(x+h)-(2x^2-3x)}{h}$ $f^{/}(x)=\lim_{h\to 0}\frac{2x^2+4xh+2h^2-3x-3h-2x^2+3x}{h}$ $=\lim_{h\to 0}\frac{4xh+2h^2-3h}{h}$ $=\lim_{h\to 0}\frac{h(4x+2h-3)}{h}$ $=\lim_{h\to 0}(4x+2h-3)$ $\therefore f^{/}(x)=4x-3$ **OR/OF** $f(x)=2x^2-3x$ $f(x+h)=2(x+h)^2-3(x+h)$ $f(x+h)=2x^2+4xh+2h^2-3x-3h$ $f(x+h)-f(x)=4xh+2h^2-3h$ $f^{/}(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\frac{4xh+2h^2-3h}{h}$ $=\lim_{h\to 0}\frac{h(4x+2h-3)}{h}$ $=\lim_{h\to 0}(4x+2h-3)$ $\therefore f^{/}(x)=4x-3$	✓substitution ✓ $2x^2+4xh+2h^2-3x-3h$ ✓ $4xh+2h^2-3h$ ✓factorisation ✓answer (5) **OR/OF** ✓substitution ✓ $2x^2+4xh+2h^2-3x-3h$ ✓ $4xh+2h^2-3h$ ✓factorisation ✓answer (5)
9.2.1	$y=4x^5-6x^4+3x$ $\frac{dy}{dx}=20x^4-24x^3+3$	✓ $20x^4$ ✓ $-24x^3$ ✓3 (3)

9.2.2	$D_x\left[\frac{-\sqrt[3]{x}}{2}+\left(\frac{1}{3x}\right)^2\right]$ $D_x\left[\frac{-x^{\frac{1}{3}}}{2}+\frac{x^{-2}}{9}\right]$ $D_x\left[-\frac{1}{2}x^{\frac{1}{3}}+\frac{1}{9}x^{-2}\right]$ $=-\frac{1}{6}x^{-\frac{2}{3}}-\frac{2x^{-3}}{9}$ $=-\frac{1}{6x^{\frac{2}{3}}}-\frac{2}{9x^3}$	✓ $\frac{-x^{\frac{1}{3}}}{2}$ ✓ $\frac{x^{-2}}{9}$ ✓ $-\frac{1}{6}x^{-\frac{2}{3}}$ ✓ $-\frac{2x^{-3}}{9}$ (4)
		[12]

4. Eerste beginsels, dan die raaklyn met die kleinste gradiënt

Amptelike DBE-nasienriglyn · November 2022 · V7 · 12 punte

QUESTION 7/*VRAAG* 7

7.1	$f(x) = x^2 + x$ $f^{/}(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ $f^{/}(x) = \lim_{h \to 0} \frac{(x+h)^2 + (x+h) - (x^2 + x)}{h}$ $f^{/}(x) = \lim_{h \to 0} \frac{x^2 + 2xh + h^2 + x + h - x^2 - x}{h}$ $= \lim_{h \to 0} \frac{2xh + h^2 + h}{h}$ $= \lim_{h \to 0} \frac{h(2x + h + 1)}{h}$ $\therefore f^{/}(x) = 2x + 1$	✓substitution into the formula ✓ $x^2 + 2xh + h^2 + x + h$ ✓ $2xh + h^2 + h$ ✓common factor ✓answer (5)
	OR/*OF* $f(x) = x^2 + x$ $f(x+h) = (x+h)^2 + (x+h) = x^2 + 2xh + h^2 + x + h$ $f(x+h) - f(x) = x^2 + 2xh + h^2 + x + h - x^2 - x$ $= 2xh + h^2 + h$ $f^{/}(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \to 0} \frac{2xh + h^2 + h}{h}$ $= \lim_{h \to 0} \frac{h(2x + h + 1)}{h}$ $\therefore f^{/}(x) = 2x + 1$	**OR/*OF*** ✓ $x^2 + 2xh + h^2 + x + h$ ✓ $2xh + h^2 + h$ ✓substitution into the formula ✓common factor ✓answer (5)
7.2	$f(x) = 2x^5 - 3x^4 + 8x$ $f^{/}(x) = 10x^4 - 12x^3 + 8$	✓ $10x^4$ ✓ $-12x^3$ ✓ 8 (3)

7.3	$g(x) = ax^3 + 3x^2 + bx + c$
	$g^{/}(x) = 3ax^2 + 6x + b$
	$g^{//}(x) = 6ax + 6$
	$g^{//}(-1) = 6a(-1) + 6 = 0$
	$\therefore a = 1$
	For concave up $g^{//}(x) > 0$
	$6x + 6 > 0$
	$x > -1$
		✓ $g^{/}(x) = 3ax^2 + 6x + b$
		✓
		$g^{//}(-1) = 6a(-1) + 6 = 0$
		✓ $a = 1$
		✓ $x > -1$ (4)

OR/OF

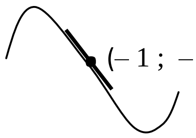
Min gradient at (– 1 ; – 7) implies:

at $x = -1$ - point of inflection
and g will be positive cubic
hence $a > 0$

Since g is concave up

$x > -1$

OR/OF



Since g is concave up
$x > -1$

Since g is concave up
$x > -1$

Answer only: $\frac{1}{4}$

OR/OF

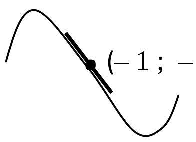
Min gradient at (– 1 ; – 7) implies:

at $x = -1$ - point of inflection
and g will be positive cubic
hence $a > 0$

Since g is concave up

$x > -1$

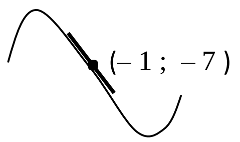
OR/OF



Since g is concave up
$x > -1$

Since g is concave up
$x > -1$

Answer only: $\frac{1}{4}$

	OR/OF Min gradient at (– 1 ; – 7) implies: at $x = -1$ - point of inflection and g will be positive cubic hence $a > 0$ Since g is concave up $x > -1$ **OR/OF**  Since g is concave up $x > -1$  Since g is concave up $x > -1$ Answer only: $\frac{1}{4}$	**OR/OF** ✓ point of inflection ✓✓ $a > 0$ ✓ $x > -1$ (4) **OR/OF** ✓✓pos graph ✓point of inflection ✓ $x > -1$ (4)
		[12]

5. Eerste beginsels, dan waar 'n raaklyn se gradiënt positief bly

Amptelike DBE-nasienriglyn · November 2023 · V7 · 13 punte

QUESTION 7/*VRAAG* 7

7.1	$f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f'(x)=\lim_{h\to 0}\frac{-4(x+h)^2-(-4x^2)}{h}$ $f'(x)=\lim_{h\to 0}\frac{-4x^2-8xh-4h^2+4x^2}{h}$ $f'(x)=\lim_{h\to 0}\frac{-8xh-4h^2}{h}$ $f'(x)=\lim_{h\to 0}\frac{h(-8x-4h)}{h}$ $f'(x)=\lim_{h\to 0}(-8x-4h)$ $f'(x)=-8x$	✓substitution into correct formula ✓ $f(x+h) = -4x^2-8xh-4h^2$ ✓simplification ✓common factor ✓answer (5)
	OR/*OF* $f(x+h)=-4(x+h)^2=-4x^2-8xh-4h^2$ $f(x+h)-f(x)=-4x^2-8xh-4h^2-(-4x^2)$ $=-8xh-4h^2$ $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f'(x)=\lim_{h\to 0}\frac{-8xh-4h^2}{h}$ $f'(x)=\lim_{h\to 0}\frac{h(-8x-4h)}{h}$ $f'(x)=\lim_{h\to 0}(-8x-4h)$ $f'(x)=-8x$	**OR/*OF*** ✓ $f(x+h) = -4x^2-8xh-4h^2$ ✓simplification ✓substitution into correct formula ✓common factor ✓answer (5)
7.2.1	$f(x)=2x^3-3x$ $f'(x)=6x^2-3$	✓ $6x^2$ ✓ -3 (2)
7.2.2	$D_x\left[7.\sqrt[3]{x^2}+2x^{-5}\right]$ $D_x\left[7.x^{\frac{2}{3}}+2x^{-5}\right]$ $=\frac{14}{3}x^{-\frac{1}{3}}-10x^{-6}$	✓ $x^{\frac{2}{3}}$ ✓derivative with rational exp ✓ $-10x^{-6}$ (3)
7.3	$-6x^2+8>0$ $x^2<\frac{8}{6}$ CV's: $x=-\frac{2}{\sqrt{3}}$ or $x=\frac{2}{\sqrt{3}}$ Positive for : $-\frac{2}{\sqrt{3}}<x<\frac{2}{\sqrt{3}}$	✓CV's: $x=\pm\frac{2}{\sqrt{3}}$ ✓✓answer (3)
		[13]

6. Eerste beginsels, dan b en c teruggevind uit 'n gegewe raaklyn

Amptelike DBE-nasienriglyn · Mei/Junie 2024 · V8 · 15 punte

QUESTION8/*VRAAG* 8

8.1	$f(x)=\frac{1}{x}$ $f'(x)=\lim\limits_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\frac{\frac{1}{(x+h)}-\frac{1}{x}}{h}$ $f'(x)=\lim\limits_{h\to 0}\frac{x-(x+h)}{x(x+h)}\times\frac{1}{h}$ $f'(x)=\lim\limits_{h\to 0}\frac{-h}{x(x+h)}\times\frac{1}{h}$ $f'(x)=\lim\limits_{h\to 0}\frac{-1}{x(x+h)}$ $f'(x)=-\frac{1}{x^2}$	✓ $f(x+h)=\frac{1}{x+h}$ ✓ $\frac{x-(x+h)}{x(x+h)}\times\frac{1}{h}$ ✓ $\frac{-h}{x(x+h)}\times\frac{1}{h}$ ✓ $\frac{-1}{x(x+h)}$ ✓answer (5)
	OR/*OF* $f(x)=\frac{1}{x}$ $f(x+h)=\frac{1}{x+h}$ $f(x+h)-f(x)=-\frac{h}{x(x+h)}$ $f'(x)=\lim\limits_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\frac{-h}{x(x+h)}\times\frac{1}{h}$ $f'(x)=\lim\limits_{h\to 0}\frac{-1}{x(x+h)}$ $f'(x)=-\frac{1}{x^2}$	**OR/*OF*** ✓ $f(x+h)=\frac{1}{x+h}$ ✓ $f(x+h)-f(x)=-\frac{h}{x(x+h)}$ ✓ $\frac{-h}{x(x+h)}\times\frac{1}{h}$ ✓ $\frac{-1}{x(x+h)}$ ✓answer (5)

8.2.1	$\frac{d}{dx}\left(\sqrt{4x^6}+\sqrt{2}.x^2\right)$ $=\frac{d}{dx}\left(2x^3+\sqrt{2}.x^2\right)$ $=6x^2+2\sqrt{2}x$	✓ $2x^3$ ✓ $6x^2$ ✓ $2\sqrt{2}x$ (3)
8.2.2	$g(x)=\frac{3x^4-4x^2+6}{x^2}$ $g(x)=3x^2-4+6x^{-2}$ $g^{/}(x)=6x-12x^{-3}$	✓ $3x^2-4+6x^{-2}$ ✓ $6x$ ✓ $-12x^{-3}$ (3)
8.3	$f(x)=3x^2+bx+c$ $f^{/}(x)=6x+b$ $f^{/}(1)=6+b=9$ $\therefore b=3$ $f(1)=3+3+c=0$ $c=-6$ $\therefore f(x)=3x^2+3x-6$	✓ $f^{/}(1)=6+b=9$ ✓ $b=3$ ✓ $f(1)=3+3+c=0$ ✓ $c=-6$ (4)
		[15]

7. Eerste beginsels, dan 'n raaklyn gemeenskaplik aan twee krommes

Amptelike DBE-nasienriglyn · Mei/Junie 2025 · V8 · 17 punte

QUESTION/*VRAAG* 8

8.1	$f(x)=x^2-2$ $f^{/}(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $f^{/}(x)=\lim\limits_{h\to 0}\dfrac{x^2+2xh+h^2-2-(x^2-2)}{h}$ $f^{/}(x)=\lim\limits_{h\to 0}\dfrac{2xh+h^2}{h}$ $f^{/}(x)=\lim\limits_{h\to 0}\dfrac{h(2x+h)}{h}$ $f^{/}(x)=\lim\limits_{h\to 0}(2x+h)$ $\therefore f^{/}(x)=2x$ **OR/*OF*** $f(x)=x^2-2$ $f(x+h)=(x+h)^2-2=x^2+2xh+h^2-2$ $f(x+h)-f(x)=2xh+h^2$ $f^{/}(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $f^{/}(x)=\lim\limits_{h\to 0}\dfrac{2xh+h^2}{h}$ $f^{/}(x)=\lim\limits_{h\to 0}\dfrac{h(2x+h)}{h}$ $f^{/}(x)=\lim\limits_{h\to 0}(2x+h)$ $\therefore f^{/}(x)=2x$	✓ $f(x+h)$ ✓ substitution ✓ simplification ✓ factorisation ✓ answer (5) **OR/*OF*** ✓ $f(x+h)$ ✓ simplification ✓ substitution ✓ factorisation ✓ answer (5)
8.2.1	$\dfrac{d}{dx}\left[3x^2-4x\right]$ $=6x-4$	✓$6x$ ✓ -4 (2)
8.2.2	$g(x)=-2\sqrt{x}(x-1)^2$ $g(x)=-2x^{\frac{1}{2}}(x^2-2x+1)$ $g(x)=-2x^{\frac{5}{2}}+4x^{\frac{3}{2}}-2x^{\frac{1}{2}}$ $g^{/}(x)=-5x^{\frac{3}{2}}+6x^{\frac{1}{2}}-x^{\frac{-1}{2}}$	✓ $x^{\frac{1}{2}}$ ✓ expansion ✓ $-5x^{\frac{3}{2}}+6x^{\frac{1}{2}}$ ✓ $-x^{\frac{-1}{2}}$ (4)

8.3	$y = 4x - 14$ tangent $\therefore 4x - 4 = 4$ $4x = 8$ $x = 2$ $\therefore y = 4(2) - 14$ at point $(2 ; -6)$ $g(2) = a(2)^2 + b(2) - 18 = -6$ $4a + 2b = 12$ ...(1) $g^/(2) = 2a(2) + b = 4$ $4a + b = 4$ …(2) (1) – (2) $b = 8$ $4a + b = 4$ $4a + 8 = 4$ $4a = -4$ $a = -1$ **OR/OF** $2x^2 - 4x - 6 = 4x - 14$ $2x^2 - 8x + 8 = 0$ $x^2 - 4x + 4 = 0$ $(x-2)^2 = 0$ $\therefore x = 2$ $\therefore y = 4(2) - 14$ at point $(2 ; -6)$ $g(2) = a(2)^2 + b(2) - 18 = -6$ $4a + 2b = 12$ ...(1) $g^/(2) = 2a(2) + b = 4$ $4a + b = 4$ ...(2) (1) – (2) $b = 8$ $4a + b = 4$ $4a + 8 = 4$ $4a = -4$ $a = -1$	✓ $4x - 4$ ✓ $= 4$ ✓ y-value ✓ $g(2) = y -$ value ✓ $g^/(2) = 4$ ✓ a and b (6) **OR/OF** ✓equating ✓ y-value ✓ $g(2) = y -$ value ✓ $g^/(x)$ ✓ $g^/(2) = 4$ ✓ a and b (6)
		[17]

8. Die reëls, 'n raaklyn by x = 2, dan eerste beginsels

Amptelike DBE-nasienriglyn · November 2024 · V8 · 18 punte

QUESTION/*VRAAG* 8

8.1.1	$\frac{d}{dx}\left[3x-5x^2\right]$ $=3-10x$	✓3 ✓$-10x$ (2)
8.1.2	$g(x)=\frac{2}{x^2}-\sqrt[3]{x^7}$ $g(x)=2x^{-2}-x^{\frac{7}{3}}$ $g^{/}(x)=-4x^{-3}-\frac{7}{3}x^{\frac{4}{3}}$	✓ $2x^{-2}$ ✓ $-x^{\frac{7}{3}}$ ✓ $-4x^{-3}$ ✓ $-\frac{7}{3}x^{\frac{4}{3}}$ (4)
8.2	$f(x)=x^3-4x^2+2x+3$ $f^{/}(x)=3x^2-8x+2$ $m=f^{/}(2)=3(2)^2-8(2)+2$ $m=-2$ $y=f(2)=(2)^3-4(2)^2+2(2)+3$ $y=-1$ $y+1=-2(x-2)$ $y=-2x+3$	✓ $m=-2$ ✓ $y=-1$ ✓ answer (3)
8.3.1	$f(x)=-6x^2$ $f^{/}(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\frac{-6(x+h)^2+6x^2}{h}$ $=\lim_{h\to 0}\frac{-6x^2-12xh-6h^2+6x^2}{h}$ $=\lim_{h\to 0}\frac{-12xh-6h^2}{h}$ $=\lim_{h\to 0}\frac{h(-12x-6h)}{h}$ $=\lim_{h\to 0}(-12x-6h)$ $=-12x$	✓substitution ✓ $f(x+h)=-6x^2-12xh-6h^2$ ✓simplification ✓common factor ✓answer (5)

	OR/*OF* $f(x)=-6x^2$ $f(x+h)=-6x^2-12xh-6h^2$ $f(x+h)-f(x)=-6x^2-12xh-6h^2+6x^2=-12xh-6h^2$ $f^{/}(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\frac{-12xh-6h^2}{h}$ $=\lim_{h\to 0}\frac{h(-12x-6h)}{h}$ $=\lim_{h\to 0}(-12x-6h)$ $=-12x$	**OR/*OF*** ✓ $f(x+h)=-6x^2-12xh-6h^2$ ✓simplification ✓substitution ✓common factor ✓answer (5)
8.3.2	$x\geq 0$ **OR/*OF*** $x\leq 0$	✓answer (1) ✓answer (1)
8.3.3	$y=-6x^2$ $x=-6y^2$ $y^2=\frac{-1}{6}x$ $y=\pm\sqrt{-\frac{1}{6}x}$ $\therefore y=-\sqrt{-\frac{1}{6}x}\quad;\quad x\leq 0$	✓ swopping x and y ✓ $y=\pm\sqrt{-\frac{1}{6}x}$ ✓ answer (3)
		[18]

9. Om f' van die draaipunte van f af te lees

Amptelike DBE-nasienriglyn · November 2024 · V9 · 8 punte

QUESTION/*VRAAG* 9

9.1	$1 < x < \frac{5}{2}$	✓✓answer (2)
9.2	$(1\,;\,0)$ and $\left(\frac{5}{2}\,;0\right)$	✓ $x=1$ ✓ $x=\frac{5}{2}$ (2)
9.3	$\dfrac{\frac{5}{2}+1}{2}$ $=\frac{7}{4}$ Concave up for $x > \frac{7}{4}$	✓method ✓answer (2)
9.4	$-9 < k < -8$	✓✓answer (2)
		[8]

10. Draaipunte, dan waar die derdegraadse grafiek konkaaf op is

Amptelike DBE-nasienriglyn · Mei/Junie 2021 · V9 · 11 punte

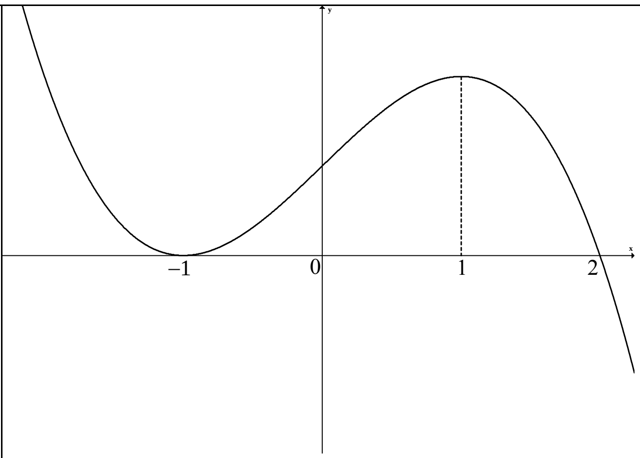
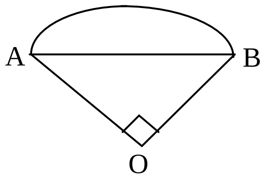
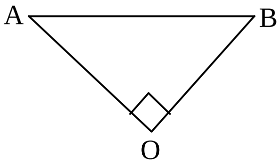
QUESTION/*VRAAG* 9

9.1	$f^{/}(x)=6x^2+6x-12$ $6x^2+6x-12=0$ $x^2+x-2=0$ $(x+2)(x-1)=0$ $x=-2$ or $x=1$ $y=20$ or $y=-7$ $\therefore$ A(–2 ; 20) and B(1 ; –7)	✓ $6x^2+6x-12$ ✓ $=0$ ✓factors ✓ x -values ✓ y -values (5)
9.2	$f^{//}(x)=12x+6$ $12x+6>0$ $12x>-6$ $x>-\frac{1}{2}$ **OR/OF** $x=\frac{-2+1}{2}=-\frac{1}{2}$ $\therefore x>-\frac{1}{2}$	✓$12x+6$ ✓ $f^{//}(x)>0$ ✓ $x>-\frac{1}{2}$ (3) **OR/OF** ✓ $x=-\frac{1}{2}$ ✓✓ $x>-\frac{1}{2}$ (3)
9.3	$f^{/}(2)=24$ Equation of the tangent: $y-4=24(x-2)$ $y=24x-44$	✓ $f^{/}(2)$ ✓ 24 ✓ equation (3)
		[11]

11. Skets 'n derdegraadse grafiek uit vier feite, sonder om ooit sy vergelyking te vind

Amptelike DBE-nasienriglyn · Mei/Junie 2021 · V10 · 13 punte

QUESTION/*VRAAG* 10

10.1		✓ $x = -1$ and $x = 2$ ✓ TP at $x = -1$ ✓ TP at $x = 1$ ✓ shape (4)
10.2.1	 Area of segment = $\frac{1}{4}$ Area of big circle $= \frac{1}{4}\pi\ (x - x^2)^2$  Area triangle ABO counted $= \text{Area }\ \Delta = \frac{1}{2}\left(x - x^2\right)^2$ Area of shaded region $= \frac{1}{4}\pi(x - x^2)^2 - \frac{1}{2}\left(x - x^2\right)^2$ $= \frac{\pi - 2}{4}\left(x - x^2\right)^2$ $= \left(\frac{\pi - 2}{4}\right)\left(x^2 - 2x^3 + x^4\right)$	✓✓ $\frac{1}{4}\pi\,(x - x^2)^2$ ✓ Area $\Delta = \frac{1}{2}\left(x - x^2\right)^2$ ✓ subtract areas ✓ common factor (5)

10.2.2	Area of shaded region $= \frac{(\pi-2)}{4}(x^4-2x^3+x^2)$ $\frac{dA}{dx} = \left(\frac{\pi-2}{4}\right)(4x^3-6x^2+2x)$ $4x^3-6x^2+2x=0$ $x(2x^2-3x+1)=0$ $x(2x-1)(x-1)=0$ $x \neq 0$ or $x=\frac{1}{2}$ or $x \neq 1$	✓ $\left(\frac{\pi-2}{4}\right)(4x^3-6x^2+2x)$ ✓ factors ✓ $x=0; x=1; x=\frac{1}{2}$ ✓ $x=\frac{1}{2}$ (4)
		[13]

12. a, b en c uit twee afsnitte, dan die lokale minimum

Amptelike DBE-nasienriglyn · Mei/Junie 2024 · V9 · 13 punte

QUESTION9/*VRAAG* 9

9.1	$f(x) = ax^3 + bx^2 + cx - 5$ $-5 = a(0+1)^2(0-5)$ $-5 = -5a$ $a = 1$ $f(x) = (x+1)(x+1)(x-5)$ $f(x) = (x^2 + 2x + 1)(x-5)$ $f(x) = x^3 - 3x^2 - 9x - 5$ $\therefore\ b = -3$ and $c = -9$	✓ substitution of x-intercepts ✓ simplification ✓ simplification (3)
9.2	$f(x) = x^3 - 3x^2 - 9x - 5$ $f'(x) = 3x^2 - 6x - 9$ $x^2 - 2x - 3 = 0$ $(x-3)(x+1) = 0$ $x = 3$ or $x = -1$ Minimum value at $x = 3$	✓ $f'(x) = 3x^2 - 6x - 9$ ✓ $f'(x) = 0$ ✓factors ✓ $x = 3$ (4)
9.3	$f''(x).f(x) > 0$ Point of inflection: $x = 1$ $x < 1$; $x \neq -1$ or $x > 5$	✓ $x = 1$ ✓ $x < 1$; $x \neq -1$ ✓ $x > 5$ (3)
9.4	$-32 < -t < -5$ $5 < t < 32$ **OR/*OF*** Shift up more than 5 units and less than 32 units $\therefore 5 < t < 32$	✓-32 ✓$-32 < -t < -5$ ✓ $5 < t < 32$ (3) **OR/*OF*** ✓more than 5 units ✓less than 32 units ✓ $5 < t < 32$ (3)
		[13]

13. a en b uit twee draaipunte, dan die x-afsnit

Amptelike DBE-nasienriglyn · November 2021 · V10 · 15 punte

QUESTION/VRAAG 10

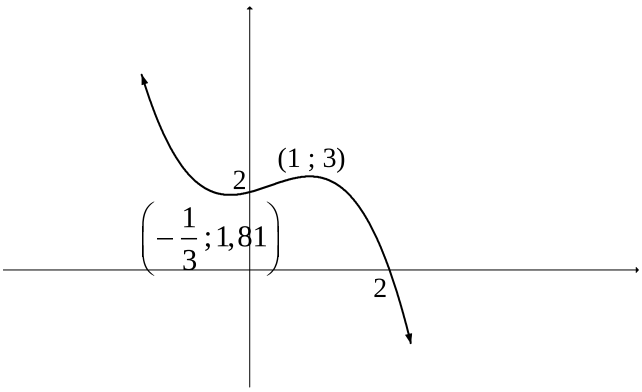
10.1	$h(x)=ax^3+bx^2$ $h^{/}(x)=3ax^2+2bx$ $h^{/}(4)=0$ $48a+8b=0$ $6a+b=0 \quad ...(1)$ $h(4)=32$ $64a+16b=32$ $4a+b=2 \quad ...(2)$ (1)– (2): $6a+b=0$ $4a+b=2$ $2a=-2$ $a=-1$ $4(-1)+b=2$ $b=6$	✓ $h^{/}(x)$ ✓ $h^{/}(4)=0$ ✓ $48a+8b=0$ or $6a+b=0$ ✓ $h(4)=32$ ✓ $64a+16b=32$ or $4a+b=2$ (5)
10.2	$h(x)=-x^3+6x^2$ $-x^3+6x^2=0$ $x^2(-x+6)=0$ $x=0$ or $x=6$ $\therefore$ A$(6\,;0)$	✓ $-x^3+6x^2=0$ ✓ factors ✓ A$(6\,;0)$ (3)
10.3.1	$0<x<4$ or $0\leq x\leq 4$ **OR/OF** $x\in(0\,;4)$ or $x\in[0\,;4]$	✓critical values ✓notation (2) **OR/OF** ✓critical values ✓notation (2)
10.3.2	$x>2$ **OR/OF** $x\in(2\,;\infty)$	✓ 2 ✓ notation (2) **OR/OF** ✓ 2 ✓ notation (2)
10.4	$f(x)=h(x-1)=-(x-1)^3+6(x-1)^2$ $f(0)=7$ $7<k<32$ or $k\in(7\,;32)$	✓ $k<32$ ✓ new y-intercept = 7 ✓ $7<k<32$ (3)
		[15]

14. Gegee die grafiek van f', werk terug na f

Amptelike DBE-nasienriglyn · November 2022 · V8 · 17 punte

QUESTION 8/*VRAAG* 8

8.1	$f^{/}(x)=mx^2+nx+k$ $f^{/}(x)=m\left(x+\frac{1}{3}\right)(x-1)$ $1=m\left(0+\frac{1}{3}\right)(0-1)$ $1=-\frac{1}{3}m$ $\therefore m=-3$ $f^{/}(x)=-3\left(x+\frac{1}{3}\right)(x-1)$ $f^{/}(x)=-3\left(x^2-\frac{2}{3}x-\frac{1}{3}\right)$ $f^{/}(x)=-3x^2+2x+1$ $\therefore n=2$ $\therefore k=1$ **OR/OF** $k=1$ $0=m+n+1$ and $\frac{1}{9}m-\frac{1}{3}n+1=0$ $m+n=-1$ (1) $m-3n=-9$ (2) (1) – (2) $4n=8$ $\therefore n=2$ $m+2=-1$ $\therefore m=-3$	✓ substitution of $\left(-\frac{1}{3}\,;0\right)$ and (1 ; 0) ✓ substitution of (0 ; 1) ✓ $m=-3$ ✓ $f^{/}(x)=-3\left(x^2-\frac{2}{3}x-\frac{1}{3}\right)$ ✓ $n=2$ ✓ $k=1$ (6) **OR/OF** ✓ $k=1$ ✓ $m+n=-1$ ✓ $m-3n=-9$ ✓ $4n=8$ ✓ $n=2$ ✓ $m=-3$ (6)
8.2.1	$f(x)=-x^3+x^2+x+2$ $f\left(-\frac{1}{3}\right)=\frac{49}{27}=1{,}81$ T.P$\left(-\frac{1}{3}\,;\frac{49}{27}\right)$ $f(1)=3$ T.P$(1\,;3)$	✓ x-coordinates of the TP ✓ T.P$\left(-\frac{1}{3}\,;\frac{49}{27}\right)$ ✓ T.P$(1\,;3)$ (3)

8.2.2	$f(x) = -x^3 + x^2 + x + 2$ $-x^3 + x^2 + x + 2 = 0$ $(x-2)(-x^2 - x - 1) = 0$ $x = 2$ or no solution  	✓ $x = 2$ ✓one x-intercept ✓ two turning points ✓y-intercept ✓ shape: neg cubic (5)

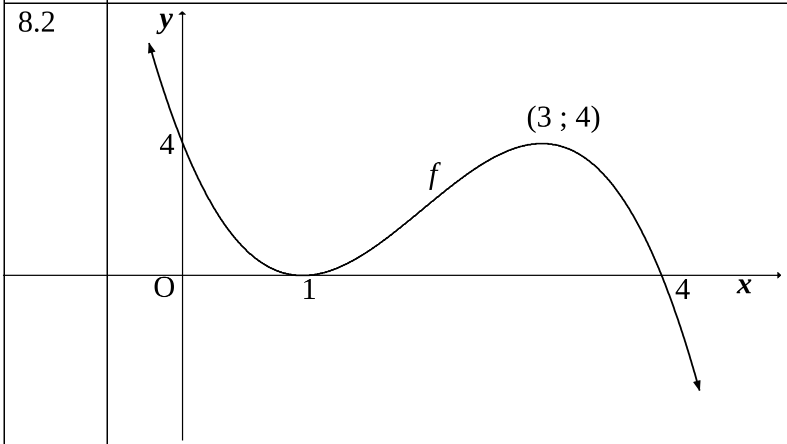
8.3.1	$a = \dfrac{-\frac{1}{3}+1}{2}$
	$= \frac{1}{3}$
	OR/OF
	$f^{/}(x) = -3x^2 + 2x + 1$
	$f^{//}(x) = -6x + 2$
	$f^{//}(a) = -6a + 2 = 0$
	$-6a = -2$
	$a = \frac{1}{3}$
		✓ answer (1)
		OR/OF
		✓ answer (1)

8.3.2	$b < \frac{4}{3}$ units	✓ $\frac{4}{3}$ ✓ $b < \frac{4}{3}$ (2)
		[17]

15. Draaipunte, 'n skets, dan om antwoorde daarvan af te lees

Amptelike DBE-nasienriglyn · November 2023 · V8 · 18 punte

QUESTION 8/*VRAAG* 8

8.1	$f^{/}(x) = -3x^2 + 12x - 9$ $-3x^2 + 12x - 9 = 0$ $x^2 - 4x + 3 = 0$ $(x-3)(x-1) = 0$ $\therefore x = 3$ or $x = 1$ $f(3) = -(3)^3 + 6(3)^2 - 9(3) + 4 = 4$ $f(1) = -(1)^3 + 6(1)^2 - 9(1) + 4 = 0$ $\therefore$ turning points are: (3 ; 4) and (1 ; 0)	✓ $f^{/}(x) = -3x^2 + 12x - 9$ ✓ $f^{/}(x) = 0$ ✓ both x-values ✓ both y-values (4)
8.2		✓ y-intercept ✓ both x-intercepts ✓ both turning points ✓ shape (4)
8.3	$0 < k < 4$ or/*of* $k \in (0\,;4)$	✓✓k between y-values of turning points (2)

8.4	$f^{//}(x) = -6x + 12 = 0$
	$x = 2$
	Max at (2 ; 2)
	
	$f^{/}(2) = 3$
	$\therefore y - 2 = 3(x-2)$ or $2 = 3(2) + c$
	$g(x) = 3x - 4$ $g(x) = 3x - 4$
	
	OR/*OF*
	Point of inflection: $x = \frac{3+1}{2}$
	$x = 2$
	Max at (2 ; 2)
	
	$f^{/}(2) = 3$
	$\therefore y - 2 = 3(x-2)$ or $2 = 3(2) + c$
	$g(x) = 3x - 4$ $g(x) = 3x - 4$
		✓ $f^{//}(x) = -6x + 12$
		✓ $f^{//}(x) = 0$
		✓ x-value
		✓ y-value
		✓gradient at x-value
		✓equation of tangent
		(6)
		
		OR/*OF*
		✓✓ $\frac{3+1}{2}$
		✓ x-value
		✓ y-value
		✓gradient at x-value
		✓equation of tangent (6)

8.5	$\tan\theta = 3$ $\therefore \theta = 71{,}57°$	✓ gradient of g ✓ answer (2)
		[18]

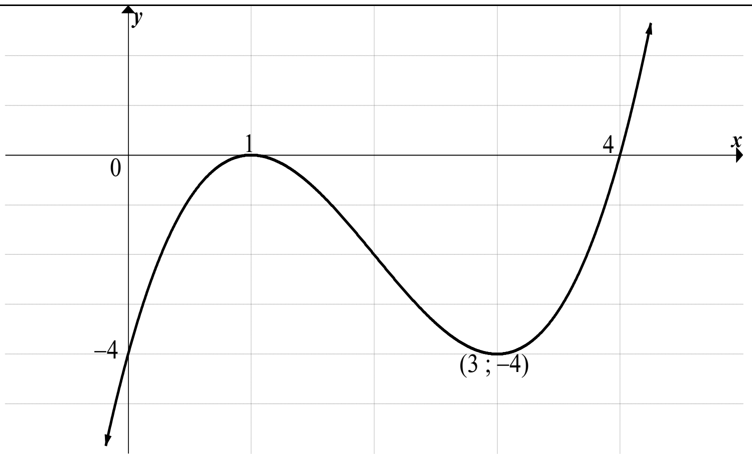
16. Toon dat k = 1, dan die draaipunte, die konkawiteit en die skets

Amptelike DBE-nasienriglyn · Mei/Junie 2025 · V9 · 18 punte

QUESTION/*VRAAG* 9

9.1	$f(x)=(x-4)(x^2-2x+1)$ $f(x)=(x-4)(x-1)^2$ $\therefore k=1$ **OR/*OF*** $f(1)=1-6+9-4=0$ $(x-1)$ is a factor $\therefore k=1$ **OR/*OF*** $-4k^2=-4$ $k^2=1$ $\therefore k=1$	✓ (x^2-2x+1) ✓ $(x-1)^2$ (2) **OR/*OF*** ✓ $f(1)$ ✓ $f(1)=0$ (2) **OR/*OF*** ✓ $-4k^2=-4$ ✓ $k^2=1$ (2)
9.2	$3x^2-12x+9=0$ $x^2-4x+3=0$ $(x-3)(x-1)=0$ $x=3$ or $x=1$ TP's: $(3\,;-4)$ and $(1\,;0)$	✓ $f^{/}(x)$ ✓ values of x ✓✓turning points (4)

9.3	$f^{//}(x)=6x-12$
	$f^{//}(-3)=-30$
	$f^{//}(x)<0$, therefore concave down
		✓substitution $x=-3$ into $f^{//}(x)$
		✓ concave down (2)

9.4		✓ turning points ✓ x-intercepts ✓ y-intercept ✓ shape (4)
9.5	$\text{Distance}=(-6x^2+24x-18)-(x^3-6x^2+9x-4)$ $=-6x^2+24x-18-x^3+6x^2-9x+4$ $=-x^3+15x-14$ Max distance: $-3x^2+15=0$ $3x^2=15$ $x^2=5$ $x=\pm\sqrt{5}$,but $1<x<3$ $\therefore x=\sqrt{5}$ $d(\sqrt{5})=8{,}36$ max distance = 8,36	✓ $h(x)=-2f^{/}(x)$ ✓ simplification ✓ first derivative ✓= 0 ✓ x-value ✓ answer (6)
		[18]

17. 'n Derdegraadse grafiek uit sy afsnitte, en alles wat dan volg

Amptelike DBE-nasienriglyn · Mei/Junie 2022 · V9 · 23 punte

QUESTION/*VRAAG* 9

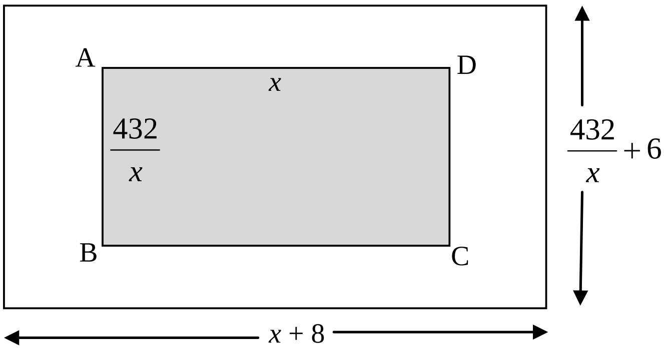
9.1	$f(x)=(x+t)^2(x-3)$ $-3=(0+t)^2(0-3)$ $1=t^2$ $t=\pm1$ $\therefore t=1$ $f(x)=(x+1)^2(x-3)$ $f(x)=(x^2+2x+1)(x-3)$ $f(x)=x^3-x^2-5x-3$	✓ $f(x)=(x+t)^2(x-3)$ ✓ subs (0 ; –3) ✓ t ✓ $f(x)=(x+1)^2(x-3)$ ✓ expansion (5)
9.2	$f'(x)=3x^2-2x-5$ $0=3x^2-2x-5$ $0=(x+1)(3x-5)$ $x=-1$ or $x=\frac{5}{3}$ $N\left(\frac{5}{3};-\frac{256}{27}\right)=(1,67;-9,48)$	✓ $f'(x)=3x^2-2x-5$ ✓ = 0 ✓ factors ✓ x-value ($x>0$) ✓ y-value (A) (5)
9.3.1	$x<3$; $x\neq-1$ **OR/*OF*** $x<-1$ or $-1<x<3$ **OR/*OF*** $(-\infty;-1)$ or $(-1;3)$	✓ $x<3$ ✓ $x\neq-1$ (2) **OR/*OF*** ✓ $x<-1$ ✓ $-1<x<3$ (2) **OR/*OF*** ✓ $(-\infty;-1)$ ✓ $(-1;3)$ (2)
9.3.2	$x<-1$ or $x>\frac{5}{3}$ OR/OF $x\leq-1$ or $x\geq\frac{5}{3}$ **OR/*OF*** $(-\infty;-1)$ or $\left(\frac{5}{3};\infty\right)$ OR/OF $(-\infty;-1]$ or $\left[\frac{5}{3};\infty\right)$	✓ $x<-1$ ✓ $x>\frac{5}{3}$ (2) **OR/*OF*** ✓ $(-\infty;-1)$ ✓ $\left(\frac{5}{3};\infty\right)$ (2)
9.3.3	$f''(x)>0$ $6x-2>0$ $x>\frac{1}{3}$ or $\left(\frac{1}{3};\infty\right)$ ANSWER ONLY: FULL MARKS **OR/OF** $\frac{\frac{5}{3}+(-1)}{2}=\frac{1}{3}$ $x>\frac{1}{3}$ or $\left(\frac{1}{3};\infty\right)$	✓ $6x-2$ ✓ $\frac{1}{3}$ ✓ $x>\frac{1}{3}$ (3) **OR/OF** ✓ substitution ✓ $\frac{1}{3}$ ✓ $x>\frac{1}{3}$ (3)

9.4	Distance $= x^3 - x^2 - 5x - 3 - (3x^2 - 2x - 5)$ $= x^3 - 4x^2 - 3x + 2$ $\frac{d\text{Distance}}{dx} = 3x^2 - 8x - 3$ $0 = 3x^2 - 8x - 3$ $0 = (3x+1)(x-3)$ $x = 3$ or $x = -\frac{1}{3}$ Max distance $= \left(-\frac{1}{3}\right)^3 - 4\left(-\frac{1}{3}\right)^2 - 3\left(-\frac{1}{3}\right) + 2$ $= \frac{68}{27} = 2{,}52$	✓ $x^3 - 4x^2 - 3x + 2$ ✓ $\frac{d\text{Distance}}{dx} = 3x^2 - 8x - 3$ ✓ factors ✓ x-values ✓ $x = -\frac{1}{3}$ ✓ answer (6)
		[23]

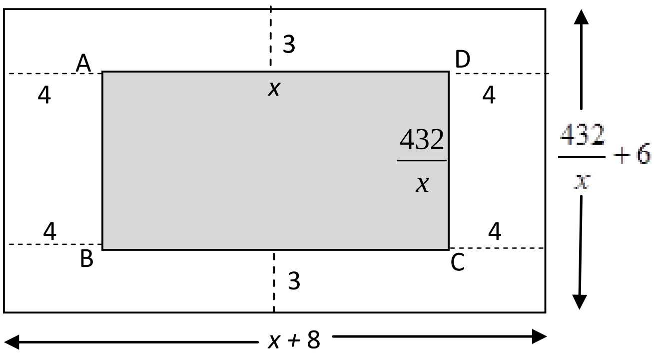
18. 'n Gedrukte plakkaat, en die grootte wat die minste bladsy mors

Amptelike DBE-nasienriglyn · November 2023 · V9 · 6 punte

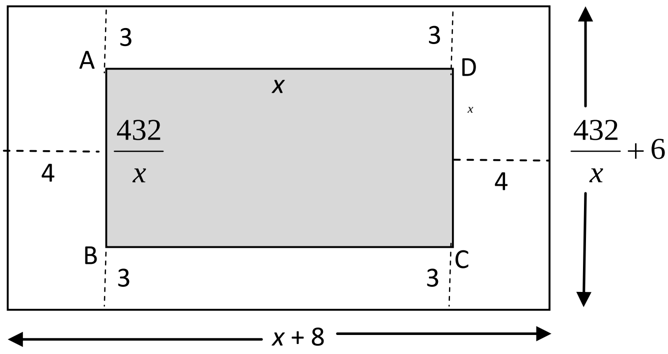
QUESTION 9/*VRAAG* 9



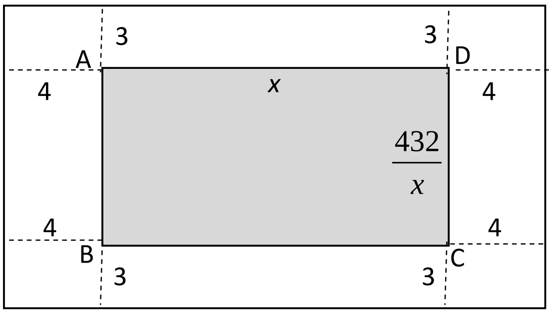
9.1	$432 = xb$ $\therefore b = \dfrac{432}{x}$ $A(x) = (x+8)\left(\dfrac{432}{x}+6\right)$ $A(x) = 432 + 6x + \dfrac{3456}{x} + 480$ $A(x) = \dfrac{3456}{x} + 6x + 480$	✓ $b = \dfrac{432}{x}$ ✓ $(x+8)$ ✓ $\left(\dfrac{432}{x}+6\right)$ (3)
9.2	$A(x) = 3456x^{-1} + 6x + 480$ $A'(x) = -\dfrac{3456}{x^2} + 6$ $-\dfrac{3456}{x^2} + 6 = 0$ $3456 = 6x^2$ $\therefore x = \sqrt{576} = 24\text{ cm}$	✓ $3456x^{-1} + 6x + 480$ ✓ $A'(x) = -\dfrac{3456}{x^2} + 6$ ✓answer (3)
		[6]



$$\text{total area} = 2(x+8)(3) + 2\left(\frac{432}{x}\right)(4) + \left(\frac{432}{x}\right)(x$$



$$\text{total area} = 2(4)\left(\frac{432}{x}+6\right)+(x)\left(\frac{432}{x}+6\right)$$



$$\text{total area} = 4(4)(3)+2(x)(3)+\left(\frac{432}{x}\right)(x)+2\left(\frac{432}{x}\right)(4$$

19. Die spoed wat 'n reis se koste so laag as moontlik hou

Amptelike DBE-nasienriglyn · November 2021 · V11 · 7 punte

QUESTION/VRAAG 11

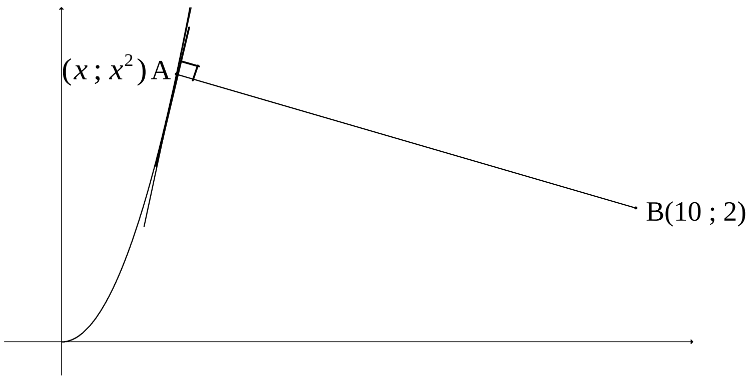
11	Time = $\frac{20}{x}$ Cost = (water cost per hour × time) + (kms × R/km) $C(x)=1{,}6\times\left(\frac{20}{x}\right)+20\left(1{,}2+\frac{x}{4000}\right)$ $C(x)=\frac{32}{x}+24+\frac{x}{200}$ $C^{/}(x)=-\frac{32}{x^2}+\frac{1}{200}=0$ $x^2=6\,400$ $x=80\,km/h$	✓ $\frac{20}{x}$ ✓ $1{,}6\times\left(\frac{20}{x}\right)$ ✓ $20\left(1{,}2+\frac{x}{4000}\right)$ ✓ $C(x)=\frac{32}{x}+24+\frac{x}{200}$ ✓ $C^{/}(x)=-\frac{32}{x^2}+\frac{1}{200}$ ✓ $C^{/}(x)=0$ ✓ answer (A) (7)
		[7]

20. Die kortste afstand van 'n punt na 'n parabool

Amptelike DBE-nasienriglyn · November 2022 · V9 · 8 punte

QUESTION9/*VRAAG* 9

9.1	Any point on f : $\left(x\,;x^2\right)$	✓ $\left(x\,;x^2\right)$
	$\text{distance} = \sqrt{(x-10)^2+(x^2-2)^2}$	✓ substitution
	$= \sqrt{x^2-20x+100+x^4-4x^2+4}$	✓ simplification
	$= \sqrt{x^4-3x^2-20x+104}$	✓ answer
	For min distance	
	$\frac{d}{dx}\left(x^4-3x^2-20x+104\right)=0$	
	$4x^3-6x-20=0$	✓ $4x^3-6x-20$
	$(x-2)(4x^2+8x+10)=0$	✓ derivative = 0
	$\Delta = 8^2-4(4)(10)=-96 \quad \therefore$ no roots	
	$\therefore x=2$	✓ $x = 2$
	$d = \sqrt{2^4-3(2)^2-20(2)+104} = 2\sqrt{17} = 8{,}25$	✓ answer (A) (8)

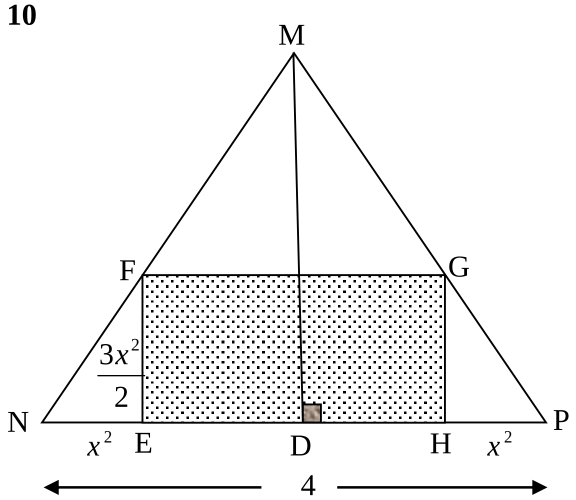


9.2	$m_{AB} = \frac{y_2-y_1}{x_2-x_1} = \frac{x^2-2}{x-10}$	✓ m_{AB}
	$\therefore m_{\tan g} = -\frac{x-10}{x^2-2}$	✓ $m_{\tan g} = -\frac{x-10}{x^2-2}$
	$f^{/}(x)=2x$	✓ $f^{/}(x)=2x$
	$\therefore 2x = -\frac{x-10}{x^2-2}$	✓ equating
	$-2x^3+4x = x-10$	
	$2x^3-3x-10=0$	✓ standard form
	$x=2$	✓ $x = 2$
	$y=(2)^2=4$	
	$\therefore AB = \sqrt{(2-10)^2+(4-2)^2}$	✓ substitute into distance
	$= 2\sqrt{17} = 8{,}25$	✓ answer (A) (8)
		[8]

21. Toon dat die oppervlakte 6x kwadraat min 3x tot die vierde is, dan maksimeer dit

Amptelike DBE-nasienriglyn · Mei/Junie 2024 · V10 · 8 punte

QUESTION 10/*VRAAG* 10



10.1	$\frac{\text{NE}}{\text{EF}}=\frac{2}{3}=\frac{x^2}{b}$ $3x^2=2b$ $\therefore b=\frac{3x^2}{2}$ $\text{EH}=4-2x^2$ Area EFGH = $(4-2x^2)\left(\frac{3x^2}{2}\right)$ $\text{A}(x)=6x^2-3x^4$ **OR/OF** In ΔDMP: $\tan P=\frac{3}{2}$ In ΔHGP: $\tan P=\frac{GH}{x^2}$ $\frac{GH}{x^2}=\frac{3}{2}$ $\therefore b=\frac{3x^2}{2}$ $\text{EH}=4-2x^2$ Area EFGH = $(4-2x^2)\left(\frac{3x^2}{2}\right)$ $\text{A}(x)=6x^2-3x^4$	✓ $\frac{\text{NE}}{\text{EF}}=\frac{2}{3}=\frac{x^2}{b}$ ✓ $\therefore b=\frac{3x^2}{2}$ ✓ $\text{EH}=4-2x^2$ ✓ $(4-2x^2)\left(\frac{3x^2}{2}\right)$ (4) **OR/OF** ✓ $\frac{\text{GH}}{x^2}=\frac{2}{3}$ ✓ $\therefore b=\frac{3x^2}{2}$ ✓ $\text{EH}=4-2x^2$ ✓ $(4-2x^2)\left(\frac{3x^2}{2}\right)$ (4)
10.2	$\text{A}(x)=6x^2-3x^4$ $\text{A}'(x)=12x-12x^3=0$ $12x(1-x^2)=0$ $\therefore x\neq 0$ or $x=-1$ or $x=1$ $\therefore$ max area: $\text{A}(1)=6(1)^2-3(1)^4=3\text{ cm}^2$	✓ $12x-12x^3=0$ ✓ values of x ✓ correct substitution ✓ answer (4)
		[8]

22. 'n Fietsryer se spoed, gegee as 'n tempo van verandering

Amptelike DBE-nasienriglyn · November 2024 · V10 · 8 punte

QUESTION/*VRAAG* 10

10.1	$-6t+18=0$ $18=6t$ $3=t$ $s'(3)=-3(3)^2+18(3)=27$	✓ $=0$ ✓ value of t ✓ answer (3)
10.2	$-3t^2+18t=0$ $-3t(t-6)=0$ $t=0$ or $t=6$ $s(t)=at^3+bt^2$ $s'(t)=3at^2+2bt$ $3a=-3$ and $2b=18$ $a=-1$ $b=9$ $s(t)=-1t^3+9t^2$ $s(6)=-(6)^3+9(6)^2$ $s(6)=108$	✓ factors ✓ values ✓ a and b ✓ substitution ✓ answer (5)
		[8]