

AFDELING A : MEERVOUDIGE KEUSE VRAE. 20 PUNTE

Beantwoord vrae 1 tot 10 op die MERKLEESVORM se **KANT 2**.

Indien kant 1 gebruik word sal dit nie nagesien word nie.

Gebruik 'n sagte potlood.

Jy mag nie verkeerde antwoorde uitvee op die merkleesvorm nie. Omkring dus eers jou antwoorde in hierdie vraestel en merk die antwoorde op die vorm as jy seker is van jou keuse.

SECTION A: MULTIPLE CHOICE QUESTIONS. 20 MARKS

Answer questions 1 to 10 on the OPTIC READER FORM on **SIDE 2**.

If side 1 is used it will not be marked.

Use a soft pencil.

You may not erase wrong answers on the optic reader form. First circle your answers in this paper and only mark the answers on the form when you are certain of your choice.

Vraag 1 / Question 1

Die koördinate van die punt(e) waar die grafiek van $f(x) = x^4 - 4x$ 'n horisontale raaklyn het, is

The coordinates of the point(s) where the graph of $f(x) = x^4 - 4x$ has a horizontal tangent line is (are)

[1a] (1, -3)	[1b] (1, 0)	[1c] (1, -3) en / and (-1, 5)	[1d] (1, 0) en / and (-1, 0)
[1e] Geen van hierdie / None of these			

Vraag 2 / Question 2

Indien $f(x) = \sin(x^2)$, dan is $f''(x) =$

If $f(x) = \sin(x^2)$, then $f''(x) =$

[2a] $-\sin(x^2)$	[2b] $-(2x)^2 \sin(x^2)$	[2c] $-4x \sin(x^2)$	[2d] Geen van hierdie / None of these
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Vraag 3 / Question 3

Indien $x^3 + y^2 + y = 4$, dan is $\frac{dy}{dx} =$

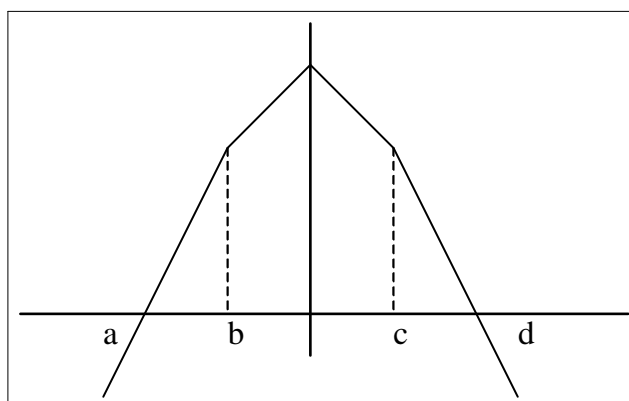
If $x^3 + y^2 + y = 4$, then $\frac{dy}{dx} =$

[3a] $3x^2$	[3b] $-2y - 3x^2$	[3c] $\frac{-3x^2}{2y + 1}$	[3d] $\frac{4 - 3x^2}{2y + 1}$
[3e] Geen van hierdie / None of these			

Vraag 4 / Question 4

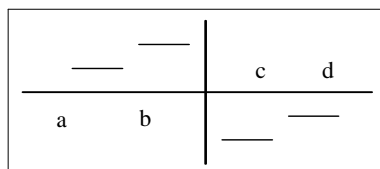
Beskou die grafiek van die funksie f hieronder.

Consider the graph of the function f below.

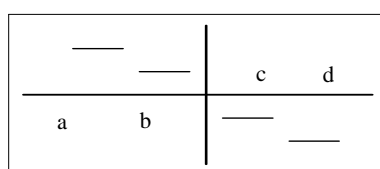


Die grafiek van die afgeleide funksie f' op $[a, d]$ is

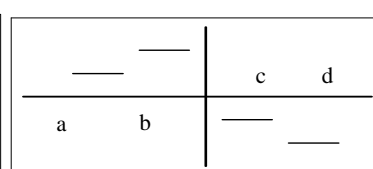
The graph of the derivative function f' op $[a, d]$ is



[4a]



[4b]



[4c]

[4d] Geen van hierdie / None of these

Vraag 5 / Question 5

Die kritieke getal(le) van $f(x) = 2x^3 - 9x^2 + 12x$ is

The critical number(s) of $f(x) = 2x^3 - 9x^2 + 12x$ is (are)

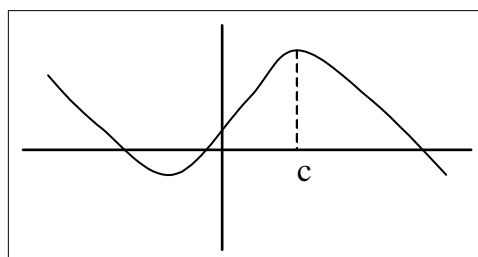
[5a] 0 [5b] 1, 2 [5c] -1, -2 [5d] -1, 2 [5e] 1, -2

[5f] Geen van hierdie / None of these

Vraag 6 / Question 6

Beskou die grafiek van die funksie f hieronder. Watter bewering is waar?

Consider the graph of the function f below. Which statement is true?



[6a] $f''(c) = 0$ [6b] $f''(c) > 0$ [6c] $f''(c) < 0$ [6d] Geen van hierdie / None of these

Vraag 7 / Question 7

Beskou die funksie $f(x) = \frac{1}{x^2 + 1}$ met $f'(x) = \frac{-2x}{(x^2 + 1)^2}$.

Consider the function $f(x) = \frac{1}{x^2 + 1}$ with $f'(x) = \frac{-2x}{(x^2 + 1)^2}$.

Die globale maksimum van f op die interval $[1, 2]$ is

The global maximum of f on the interval $[1, 2]$ is

[7a] $\frac{1}{5}$	[7b] $\frac{1}{2}$	[7c] 1	[7d] Geen van hierdie / None of these
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Vraag 8 / Question 8

Beskou die funksie f met $f(x) = x^4 - 2x^3$.

Watter een van die volgende bewerings is waar?

Consider the function f with $f(x) = x^4 - 2x^3$.

Which one of the following statements is true?

[8a]	f het 'n lokale minimum by $x = 0$	f has a local minimum at $x = 0$
[8b]	f het 'n lokale maksimum by $x = 0$	f has a local maximum at $x = 0$
[8c]	f het 'n infleksiepunt by $x = 0$	f has a inflection point at $x = 0$
[8d]	Geen van hierdie	None of these

Vraag 9 / Question 9

$$\lim_{x \rightarrow \infty} \frac{x^2}{\ln x}$$

[9a] = 2	[9b] = 1	[9c] = 0	[9d] = ∞	[9e] Geen van hierdie / None of these
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Vraag 10 / Question 10

$$\lim_{x \rightarrow 0} \frac{\sin x}{x^2 - x}$$

[10a] = 0	[10b] = 1	[10c] = -1	[10d] Bestaan nie / Does not exist
[10e] Geen van hierdie/None of these			

[20]

AFDELING B MAKSIMUM 30 PUNTE

BEANTWOORD ALLE VERDERE VRAE OP HIERDIE VRAESTEL IN INK.

SECTION B MAXIMUM 30 MARKS

ANSWER ALL THE FOLLOWING QUESTIONS ON THIS PAPER IN INK.

Vraag 11 / Question 11

Bepaal die volgende afgeleides. Moenie jou antwoorde vereenvoudig nie.

Find the following derivatives. Do not simplify your answers.

i $f'(t)$ as $f(t) = \text{bgsin}(e^{2t}) - \text{bgtan}\sqrt{t}$ (Notasie: $\text{bgsin} = \sin^{-1}$ en $\text{bgtan} = \tan^{-1}$)

$f'(t)$ if $f(t) = \arcsin(e^{2t}) - \arctan\sqrt{t}$ (Notation: $\arcsin = \sin^{-1}$ en $\arctan = \tan^{-1}$)

[2]

ii $f''(x)$ as / if $f(x) = \ln(1 + \cos x)$

[2]

iii $\frac{ds}{dt}$ as / if $s = \text{cosec}^3\left(\frac{2}{t}\right)$

[1]

iv $\frac{dy}{dx}$ as / if $x^4 + \tan y = y + 2^x$

[2]

v $\frac{dy}{dx}$ as / if $y = x^{2 \sin x}$

[3]

Vraag 12 / Question 12

Bepaal / Calculate $\lim_{x \rightarrow \infty} (1 + \frac{3}{x})^x$

[3]

Vraag 13 / Question 13

- i Beskou die funksie f met sy afgeleide funksies f' en f'' .

Consider the function f with its derived functions f' and f'' .

$$f(x) = \frac{x}{(x+1)^2} \quad f'(x) = \frac{1-x^2}{(x+1)^4} \quad f''(x) = \frac{2x-4}{(x+1)^4}$$

Bepaal die interval(le) waarop f stygend is.

Find the interval(s) on which f is increasing.

- ii Beskou die funksie f met sy afgeleide funksies f' en f'' .

Consider the function f with its derived functions f' and f'' .

$$f(x) = -x^2 + \frac{1}{9}e^{-3x} \quad f'(x) = -2x - \frac{1}{3}e^{-3x} \quad f''(x) = -2 + e^{-3x}$$

Bepaal die interval(le) waarop f konkaf na onder is.

Find the interval(s) on which f is concave downward.

[4]

Vraag 14 / Question 14

Beskou die funksie f met $f(x) = x^{\frac{2}{3}} - 1$.

Consider the function f with $f(x) = x^{\frac{2}{3}} - 1$.

- i Bepaal die kritieke getal(le) van f .

Find the critical number(s) of f .

- ii Bepaal die lokale ekstreme van f indien dit bestaan.

Find the local extremes of f if they exist.

- iii Bepaal die globale ekstreme van f indien dit bestaan.

Find the global extremes of f if they exist.

[5]

Vraag 15 / Question 15

- i Gee die definisie van 'n funksie f wat dalend is op 'n interval I

Write down the definition of a function f that is decreasing on an interval I .

- ii Formuleer die Middelwaarde Stelling.

Formulate the Mean Value Theorem.

- iii Bewys dat indien $f'(x) < 0$ op 'n interval I , dan is f dalend op die interval I .

Prove that if $f'(x) < 0$ on the interval I , then f is decreasing on the interval I .

[5]

Vraag 16 / Question 16

i Skets 'n funksie f met die volgende eienskappe:

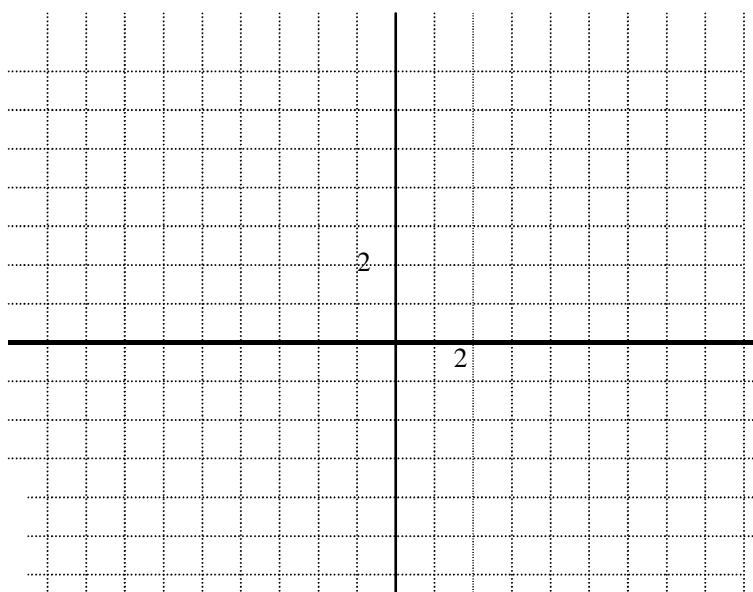
- Die definisieversameling van f is \mathbb{R} en f is kontinu op \mathbb{R} .
- f is 'n EWE funksie
- $f(0) = 5$, $f(2) = 3$ en $f(3) = 1$
- $f'(x) < 0$ as $0 < x < 3$ en $f'(x) > 0$ as $x > 3$
- $f''(x) < 0$ as $0 < x < 2$
- $f''(x) > 0$ as $x > 2$

GEBRUIK DIE TEENBLAD VIR ROFWERK.

i Sketch a function f with the following properties:

- The domain of f is \mathbb{R} and f is continuous on \mathbb{R} .
- f is an EVEN function
- $f(0) = 5$, $f(2) = 3$ en $f(3) = 1$
- $f'(x) < 0$ if $0 < x < 3$ and $f'(x) > 0$ if $x > 3$
- $f''(x) < 0$ if $0 < x < 2$
- $f''(x) > 0$ if $x > 2$

USE THE FACING PAGE FOR ROUGH WORK



Antwoord in pen / Answer in pen

[4]

ii Gee die lokale ekstreme van f .

Write down the local extremes of f .

[2]

