VRAAG 1

Laat $f(x) = \ell n(-x^2 - x + 2)$ en
$g(x) = x + 2$

1.1) Gee die grootste moontlike definisieversameling van f

1.2) Gee 'n formule vir $(g \circ f)(x)$

QUESTION 1

Let $f(x) = \ell n(-x^2 - x + 2)$ and
$g(x) = x + 2$

1.1) Give the largest possible domain of f

1.2) Give a formula for $(g \circ f)(x)$

[3]

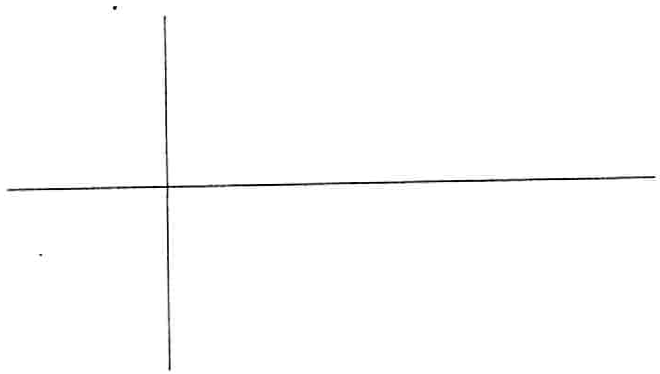
VRAAG 2

Laat / Let $f(x) = -\sin\left(x + \frac{\pi}{3}\right)$ op/on $\left[-\frac{\pi}{2}, 2\pi\right]$.

Skets die grafiek van f deur te begin met die grafiek van $y = \sin x$.
Toon alle afsnitte op die asse, asook die minimum en maksimum waardes, op die grafiek aan.

QUESTION 2

Sketch the graph of f by starting with the graph of $y = \sin x$.
Indicate all intercepts with the axes, also the minima and maxima, on the graph.



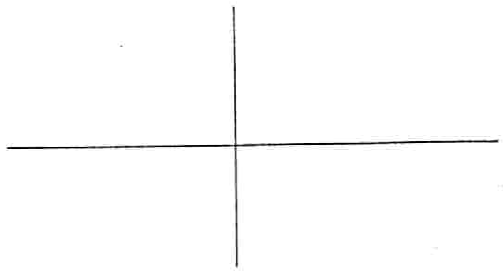
[4]

VRAAG 3

3.1 Skets die grafiek van $g(x) = \sin|x|$ vir $-2\pi \leq x \leq 2\pi$.

QUESTION 3

3.1 Sketch the graph of $g(x) = \sin|x|$ for $-2\pi \leq x \leq 2\pi$.



[2]

[2]

3.2 Los op/Solve $2\sin x < 1$, op/on $\left[-\frac{\pi}{2}, \pi\right]$

VRAAG 4

Bepaal die volgende limiete indien hulle bestaan:

4.1) $\lim\limits_{x \to 1} \dfrac{1 - \sqrt{2x^2 - 1}}{x - 1}$

[3]

4.2) $\lim\limits_{x \to 3} \dfrac{3 - x}{|x - 3|}$

QUESTION 4

Determine the following limits whenever they exist:

[4]

[

VRAAG 4

Beskou die funksie

$$f(x) = e^{1/x} \quad \text{vir/for} \quad x \neq 0$$

Is dit moontlik om f te herdefinieer sodat f kontinu by nul is? Verduidelik.

QUESTION 4

Consider the function

Is it possible to redefine f so that f becomes continuous at zero? Explain.

[3]

VRAAG 5

Toon aan dat die krommes

$$y = x^3 - 6x + 2$$
$$\text{en/and} \quad y = \frac{3}{2}x^2 - 8$$

'n gemeenskaplike raaklyn in die punt (2, -2) het en bepaal die vergelyking van hierdie raaklyn.

QUESTION 5

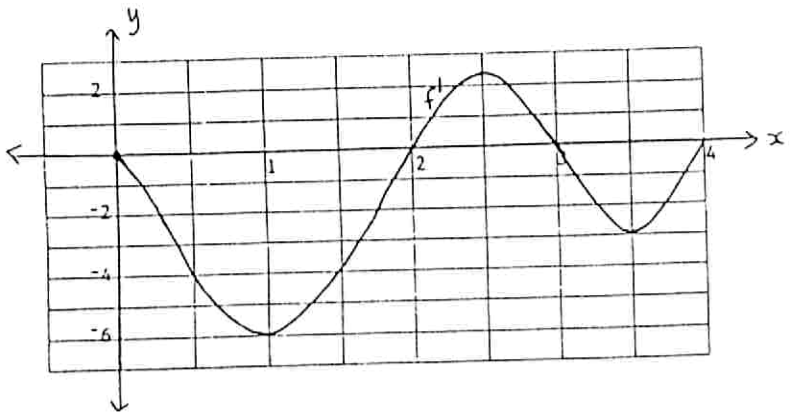
Show that the curves

have a common tangent at the point (2, -2) and find the equation of this tangent line.

[4]

VRAAG 6

Gegee die grafiek van die AFGELEIDE f' van 'n funksie f gedefinieer op [0,4]



6.1 Gee die interval(le) waarop f stygend is. Verduidelik.

[2]

QUESTION 6

Given the graph of the DERIVATIVE f' of a function f defined on [0,4]

6.1 Give the interval(s) on which f is increasing. Explain.

6.2 Gee die x-waarde(s) waar daar relatiewe(lokale) ekstreme voorkom.
Klassifiseer elke ooreenkomstige funksiewaarde as 'n maksimum of 'n minimum. Verduidelik.

[3]

6.3 Gee die x-waarde(s) waar daar buigpunte voorkom. Verduidelik.

[2]

6.4 Gee die interval(le) waarop f konkaaf na bo is. Verduidelik.

[2]

6.2 Give the x-value(s) where relative (local) extremes occur. Classify each corresponding function value as a maximum or a minimum. Explain.

6.3 Give the x-value(s) where inflection points occur. Explain.

6.4 Give the interval(s) on which f is concave upwards. Explain.

VRAAG 8

Bewys die **"Eerste" Fundamentele Stelling van Calculus:**
Laat f kontinu op 'n interval I wees en c enige punt in I. As

$$G(x) = \int_c^x f(t)\,dt \quad \text{vir alle } x \text{ in } I$$

dan is die funksie G differensieerbaar op I en $G'(x) = f(x)$ vir alle x in I.

QUESTION 8

Prove the **"First" Fundamental Theorem of Calculus:**
Let f be continuous on an interval I and c any point in I. If

$$G(x) = \int_c^x f(t)\,dt \quad \text{for all } x \text{ in } I$$

then the function G is differentiable on I and $G'(x) = f(x)$ for all x in I.

VRAAG 9

9.1 Bereken

$$\int_{-2}^{1} |x|\,dx$$

[3]

9.2 Bepaal

$$\int x(2x-1)^{\frac{1}{2}}\,dx$$

deur die substitusie $v = 2x - 1$ te maak.

[5]

QUESTION 9

9.1 Compute :

$$\int_{-2}^{1} |x|\,dx$$

[3]

9.2 Determine

$$\int x(2x-1)^{\frac{1}{2}}\,dx$$

by making the substitution $v = 2x - 1$.

[4]

VRAAG 10

Bepaal die oppervlakte ingeslui tussen die parabool $y = \frac{x^2}{4}$ en die lyn $y = 2x$.

[4]

QUESTION 10

Find the area enclosed between the parabola $y = \frac{x^2}{4}$ and the line $y = 2x$.

VRAAG 11

Beskou die twee vektore a en b.

$$\mathbf{a} = 2\mathbf{i} + 7\mathbf{j} - 2\mathbf{k}$$
$$\text{en/and} \quad \mathbf{b} = -\mathbf{i} - 2\mathbf{j} - 8\mathbf{k}$$

11.1 Is a ewewydig aan b? Verduidelik. [2]

11.2 Is a loodreg op b? Verduidelik. [2]

QUESTION 11

Consider the two vectors a and b.

11.1 Is a parallel to b? Explain.

11.2 Is a perpendicular to b? Explain.

VRAAG 12

Vind 'n Cartesiese vergelyking vir die vlak wat die punt $A = (1, -1, 2)$ en die lyn met simmetriese vergelykings

$$x + 2 = y + 1 = \frac{z + 5}{2}$$

bevat.

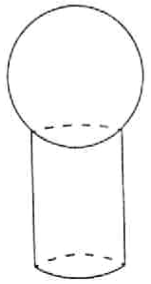
QUESTION 12

Find a Cartesian equation of the plane that contains the point $A = (1, -1, 2)$ and the line with symmetric equations

$$x + 2 = y + 1 = \frac{z + 5}{2}$$

VRAAG 13

'n Watertenk is in die vorm van 'n sfeer op 'n sirkelvormige silinder, soos in die skets. Water vloei in die tenk teen 'n konstante tempo. Skets die grafiek wat die hoogte van die water as 'n funksie van tyd aandui. Dui kritieke punte, buigpunte ens aan, indien van toepassing.



[4]

QUESTION 13

A water tank is constructed as a sphere on top of a circular cylinder, as in the sketch. Water flows into the tank at a constant rate. Sketch the graph of the height of the water as a function of time. Indicate critical points, points of inflection etc, if applicable.

[3]