

**Vraag 1**Gegee:  $f(x) = -\frac{x^2}{2}, x \leq 0$ 1.1 Bepaal die vergelyking van  $f^{-1}$  in die vorm  $f^{-1}(x) =$  (3)

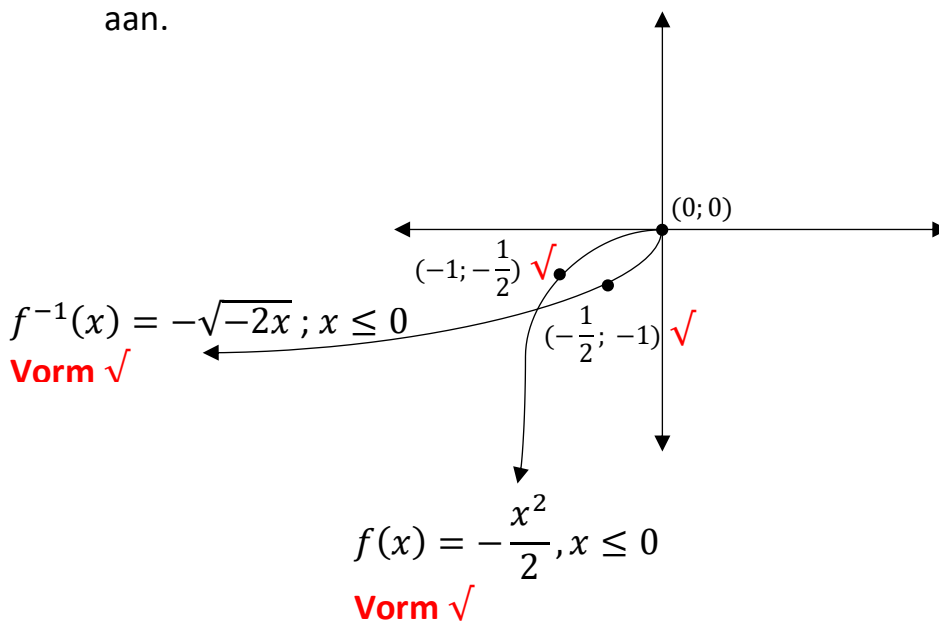
$$f(x) = -\frac{x^2}{2}$$

$$f^{-1}: x = -\frac{y^2}{2} \checkmark$$

$$f^{-1}: -2x = y^2 \checkmark$$

$$f^{-1}(x) = \pm\sqrt{-2x}; x \leq 0$$

$$f^{-1}(x) = -\sqrt{-2x}; x \leq 0 \checkmark$$

1.2 Skets die grafieke van  $f$  en  $f^{-1}$  op dieselfde assestelsel.  
Dui duidelik die afsnitte met die asse, sowel as 'n ander punt op elk van die grafieke aan. (4)1.3 Is  $f^{-1}$  'n funksie? Motiveer jou antwoord. (2)

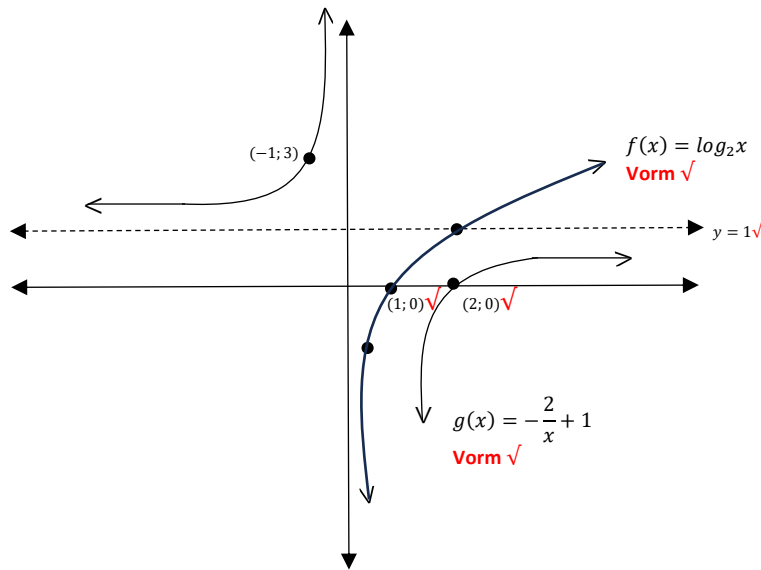
Ja  $\checkmark$ ,  $f^{-1}$  voldoen aan die vertikale lyntoets  $\checkmark$  a.g.v. die beperking van die definisieversameling van  $f$  tot  $x \leq 0$ .

## Vraag 2

Gegee:  $f(x) = \log_2 x$  en  $g(x) = -\frac{2}{x} + 1$

2.1 Skets die grafieke van  $f$  en  $g$  op dieselfde assestelsel.

Dui duidelik die afsnitte met die asse en asimptote van elke grafiek aan. (5)



2.2 Bepaal die vergelyking van die simmetrie-as van  $g$ . (2)

$$y = x\sqrt{+1}\sqrt{}$$

OF

$$y = -x\sqrt{+1}\sqrt{}$$

2.3 Bepaal die vergelyking van die inverses van beide  $f(x)$  en  $g(x)$ . (4)

$$f(x) = \log_2 x$$

$$f: 2^y = x$$

$$f^{-1}: 2^x = y\sqrt{}$$

$$f^{-1}(x) = 2^x\sqrt{}$$

$$g(x) = -\frac{2}{x} + 1$$

$$g^{-1}: x = -\frac{2}{y} + 1\sqrt{}$$

$$g^{-1}: y(x - 1) = -2$$

$$g^{-1}(x) = -\frac{2}{x-1}\sqrt{}$$

2.4 Skryf die definisieversameling en waardeversameling van  $g^{-1}$  neer. (2)

$$x \in R; x \neq 1\sqrt{}$$

$$y \in R; y \neq 0\sqrt{}$$

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### Vraag 3

3.1 Bepaal  $f'(x)$  vanuit die eerste beginsel as  $f(x) = \frac{2}{x^2}$ . (5)

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \checkmark$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{\frac{2}{(x+h)^2} - \frac{2}{x^2}}{h} \checkmark$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{\frac{2}{x^2+2xh+h^2} - \frac{2}{x^2}}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{\frac{2x^2 - 2x^2 - 4xh - 2h^2}{x^2(x^2+2xh+h^2)}}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{h(-4x-2h)\checkmark}{x^2(x^2+2xh+h^2)} \times \frac{1}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{-4x - 2h}{x^2(x^2 + 2xh + h^2)}$$

$$f'(x) = \frac{-4x - 2(0)}{x^2(x^2 + 2x(0) + 0^2)} \checkmark$$

$$f'(x) = \frac{-4}{x^3} \checkmark$$

3.2 Bepaal:

3.2.1  $y'$  indien  $y = 4x^2 + 6\sqrt{x}$  (2)

$$y = 4x^2 + 6x^{\frac{1}{2}}$$

$$y' = 8x\checkmark + \frac{3}{\sqrt{x}}\checkmark$$

3.2.2  $D_x\left[\frac{x^3-3x^2}{x}\right]$  (2)

$$D_x\left[\frac{x(x^2-3x)}{x}\right]$$

$$D_x[x^2 - 3x] \checkmark$$

$$= 2x - 3\checkmark$$

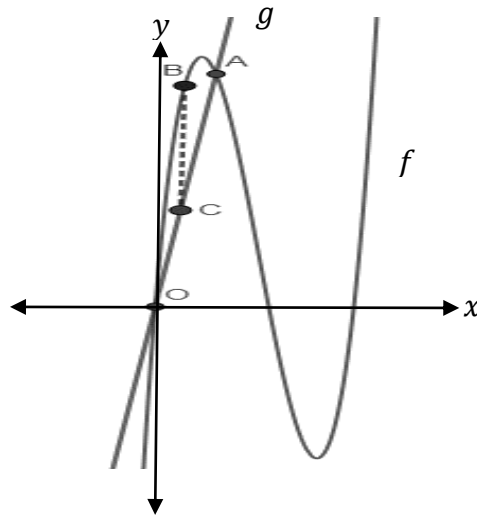
3.2.3  $\frac{dr}{dx}$  indien  $r = 4x^2\pi^2 - x$  (1)

$$\frac{dr}{dx} = 8x\pi^2 - 1\checkmark$$

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### Vraag 4

In die onderstaande diagram word die grafieke  $f(x) = x^3 - 11x^2 + 28x$  en  $g(x) = 9x$  getoon.  $A$  is die snypunt van  $f$  en  $g$ .  $BC$  is parallel aan die  $y$ -as.



Bepaal:

4.1 die waarde(s) van  $x$  waarvoor  $f(x) = 0$ . (3)

$$0 = x(x^2 - 11x + 28)$$

$$0 = x(x - 7)(x - 4)$$

$$x = 0 \checkmark \text{ of } x = 7 \checkmark \text{ of } x = 4 \checkmark$$

4.2 die maksimum lengte van  $BC$ . (6)

$$BC = x^3 - 11x^2 + 28x - 9x$$

$$BC = x^3 - 11x^2 + 19x \checkmark$$

$$\text{Vir 'n maksimum lengte is } BC' = 0$$

$$3x^2 - 22x + 19 \checkmark = 0 \checkmark$$

$$(3x - 19)(x - 1) = 0 \checkmark$$

$$x \neq \frac{19}{3} \text{ of } x = 1 \checkmark$$

$$BC = \left(\frac{19}{3}\right)^3 - 11\left(\frac{19}{3}\right)^2 + 19\left(\frac{19}{3}\right) \neq -66,85$$

$$BC = (1)^3 - 11(1)^2 + 19(1) = 9 \checkmark$$

$\therefore$  Die maksimum lengte van  $BC$  is 9 eenhede.

4.3 die koördinate van die punt op  $f$  waar die konkawiteit van die grafiek verander. (4)

$$f''(x) = 0$$

$$6x - 22 \checkmark = 0 \checkmark$$

$$x = \frac{11}{3} \checkmark$$

$$\left(\frac{11}{3}; 4,07\right) \checkmark$$

4.4 die koördinate van die raakpunt aan  $f$ , in die derde kwadrant, waar die raaklyn ewewydig is aan die lyn  $y = 53x - 51$ .

(5)

$$f'(x) = 53$$

$$3x^2 - 22x + 28 = 53 \checkmark$$

$$3x^2 - 22x - 25 = 0 \checkmark$$

$$x = \frac{-(-22) \pm \sqrt{(-22)^2 - 4(3)(-25)}}{2(3)} \checkmark$$

$$x \neq \frac{25}{3} \text{ of } x = -1 \checkmark$$

$$f(-1) = (-1)^3 - 11(-1)^2 + 28(-1) = -40$$

$$(-1; -40) \checkmark$$

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Totaal: [50]