AO1 Test for P3

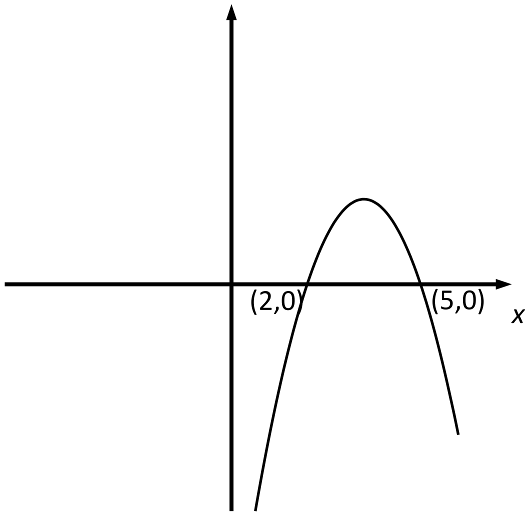
1. Simplify fully $\frac{2}{1-x^2} + \frac{1}{(1+x)^2}$

2. f(x) = 2x + 1, g(x) = x^2 for x > 0

Find (a) fg(x) (b) $f^{-1}(x)$

3. Sketch the graph of y = I4 – 3xI

4. Here is the graph of y = f(x)



(a) Sketch the graph of y = f(IxI)

(b) Sketch the graph of y = If(x)I

5. Write in terms of single trig functions

(a) cosec$x$ tan$x$ (b) $\frac{\sin x}{\text{cosecx}}$ (c) cot (90 –x)°

6. Write in terms of single trig functions

(a) (1 + tan^2x)cos$x$ (b) $\frac{1-\text{cosec}^2\emptyset}{\cot \emptyset}$

7. (a) Write 3sin$x$ – 4cos$x$ in the form Rsin (x – ϕ) where R and ϕ are to be found.

(b) Write 5cosx – 5sinx in the form Rcos(x + α) where R and α are to be found.

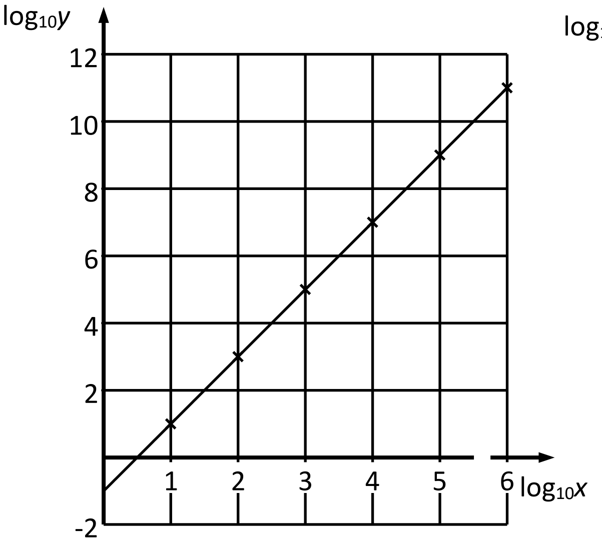
8. (a) Draw a sketch of the graph of $y = \mathrm{f}(x) = 2\mathrm{e}^{-x} + 1$

(b) Draw a sketch of the graph of $y = \mathrm{f}^{-1}(x)$

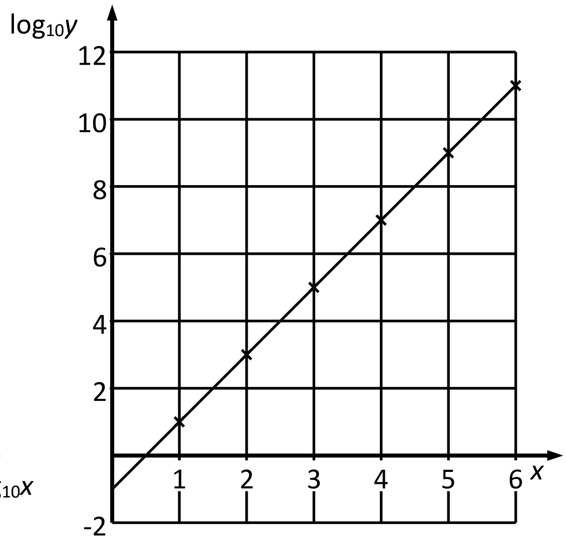
9. Solve (a) of $2\mathrm{e}^{-x} + 1 = 1.5$ (b) ln(4x + 1) = 3

10. Here are 4 graphs each containing 6 points.

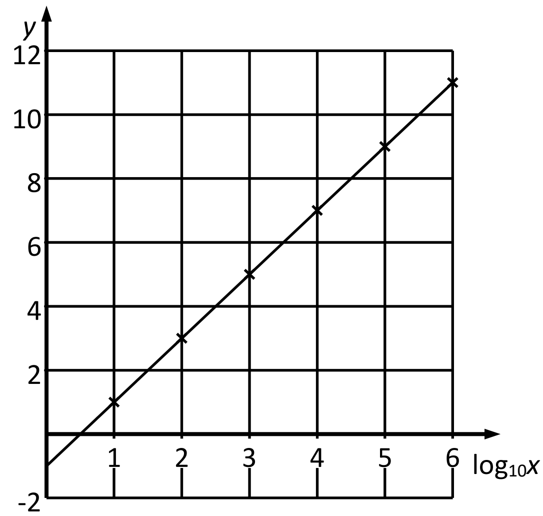
On which graph do the points obey the formula $y = mx^n$ with $n > 1$?



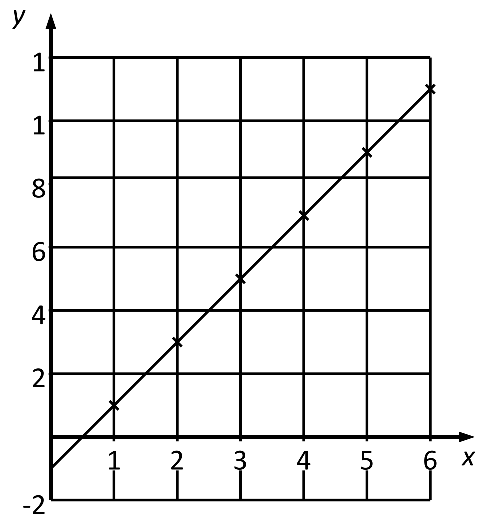
A



B



C



D

11. $y = x^2\sin x$, find the value of $\frac{\mathrm{d}x}{\mathrm{d}y}$ when $x = \pi/2$

12.(a) $\int \frac{1+\sin x}{\cos x}\mathrm{d}x$ (b) $\int \cos x \sin^3 x \mathrm{d}x$

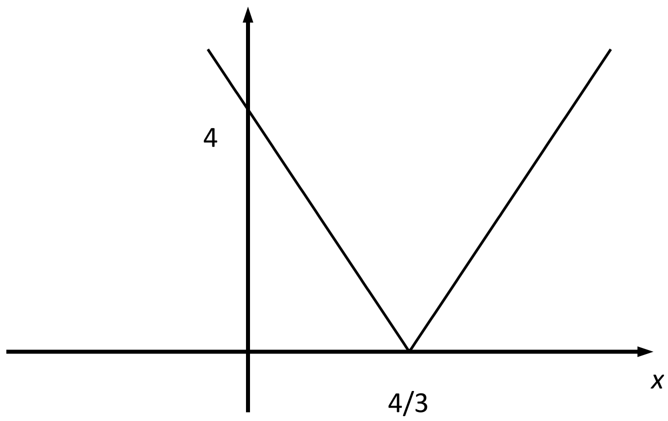
13. Show that the equation $\sqrt{x^3 + 4} - 2x - 1 = 0$ has at least one root between $x = 0$ and $x = 2$

AO1 Test for P3 Answers

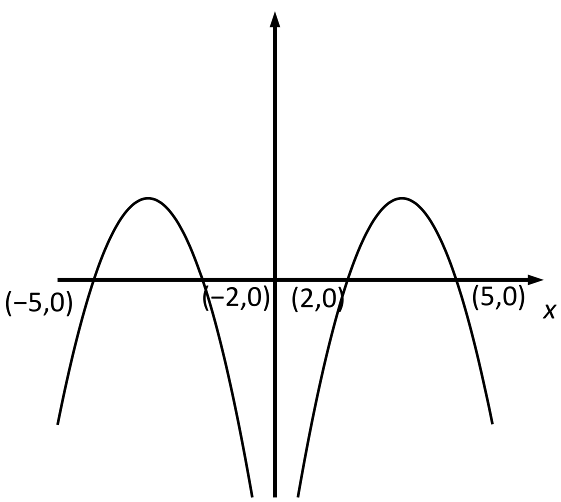
1. $\frac{3+2x}{(1-x)(1+x)^2}$

2. (a) $2x^2+1$ (b) $f^{-1}(x) = \frac{x-1}{2}$

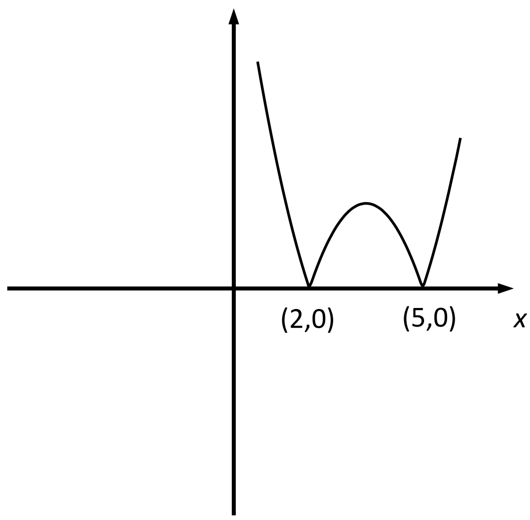
3.



4.(a)



(b)



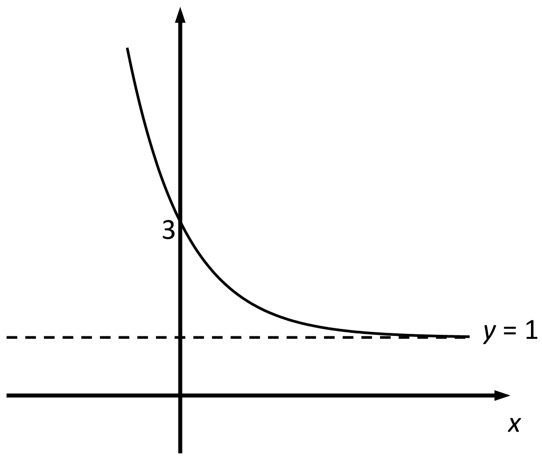
5. (a) sec$x$ (b) $\sin^2 x$ (c) tan$x$°

6. (a) sec$x$ (b) – cotϕ

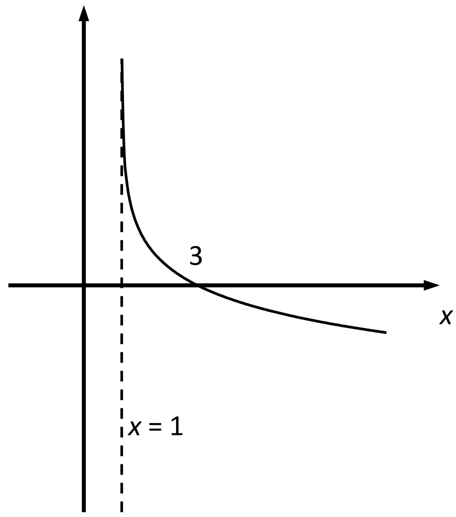
7. (a) R = 5, ϕ = arccos(3/5) = 53.1° (or 0.927 radians)

(b) R = √50 (or 5√2), α = 45° (or π/4 radians)

8. (a)



(b)



9. (a) ln4 (b) $\frac{e^3-1}{4}$

10. A since $y = mx^n$ implies log*y* = log*m* + *n*log*x*

11. $\frac{1}{\pi}$

12. (a) ln(1 + sin*x*) + c (b) $\frac{\sin x}{4}$ + c

13. Let f(x) = $\sqrt{x^3 + 4} - 2x - 1$ f(0) = 1 > 0, f(2) = √12 – 5 < 0 Since f is continuous there exists at least one root between x = 0 and x = 2