

AO1 Test for P3

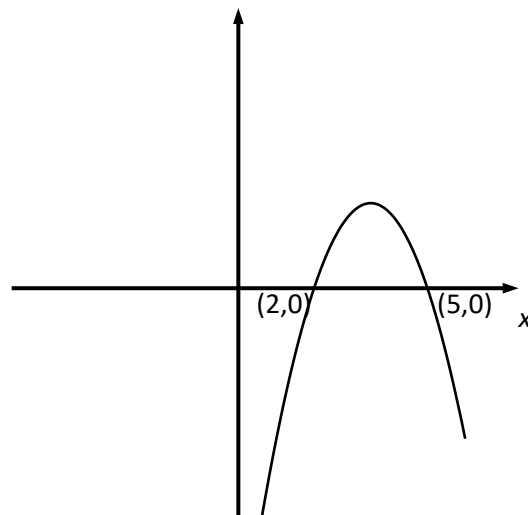
1. Simplify fully $\frac{2}{1-x^2} + \frac{1}{(1+x)^2}$

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 $y = |4 - 3x|$

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



(a) Sketch the graph of $y = f(|x|)$

(b) Sketch the graph of $y = |f(x)|$

5. Write in terms of single trig functions

(a) $\operatorname{cosec} x \tan x$ (b) $\frac{\sin x}{\operatorname{cosec} x}$ (c) $\cot(90 - x)^\circ$

6. Write in terms of single trig functions

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

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

(b) Write $5 \cos x - 5 \sin x$ in the form $R \cos(x + \alpha)$ where R and α are to be found.

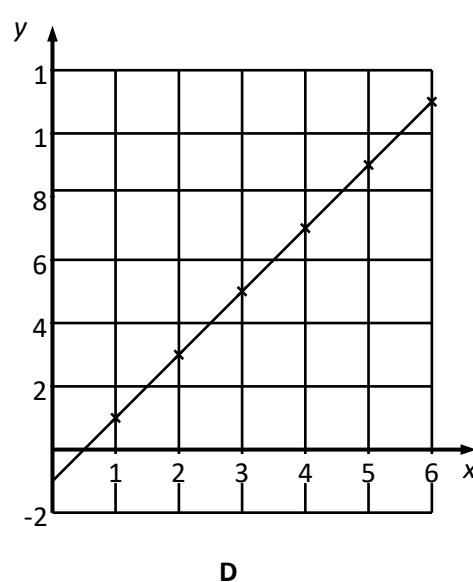
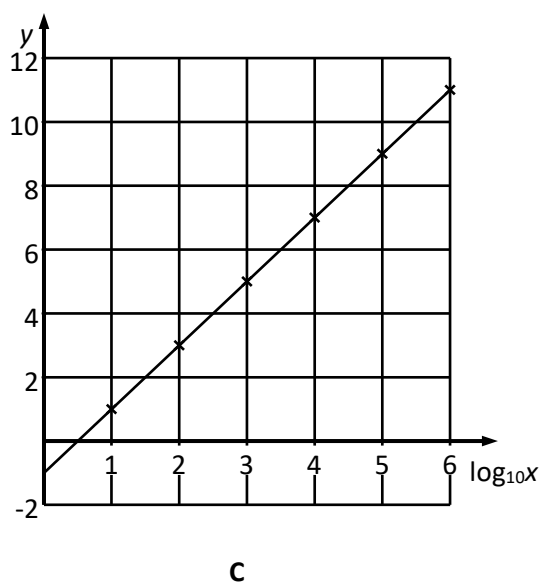
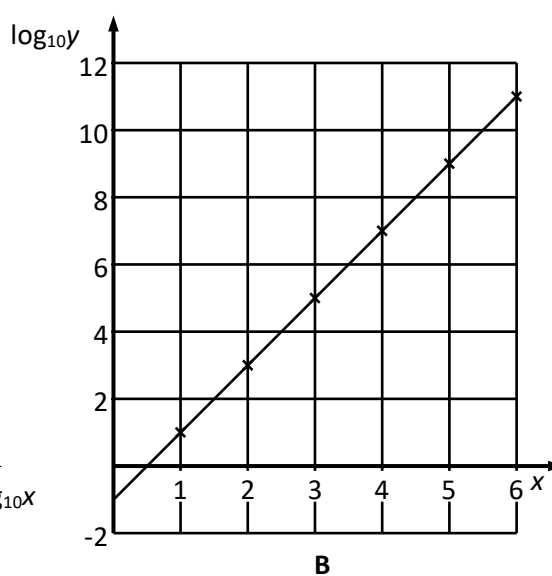
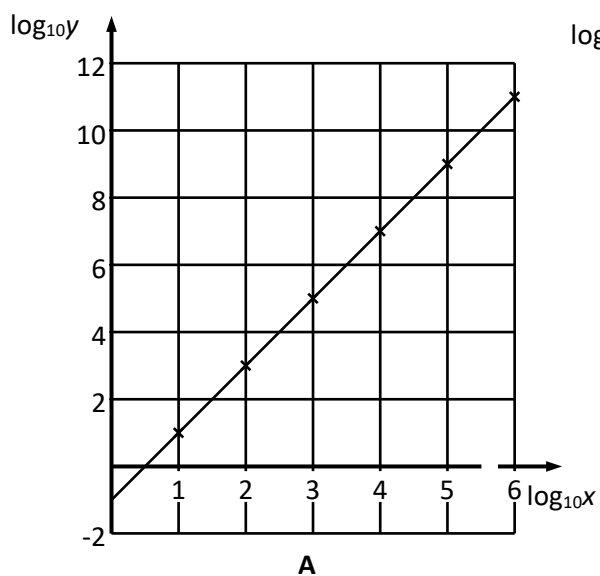
8. (a) Draw a sketch of the graph of $y = f(x) = 2e^{-x} + 1$

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

9. Solve (a) of $2e^{-x} + 1 = 1.5$ (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 $n > 1$?



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

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

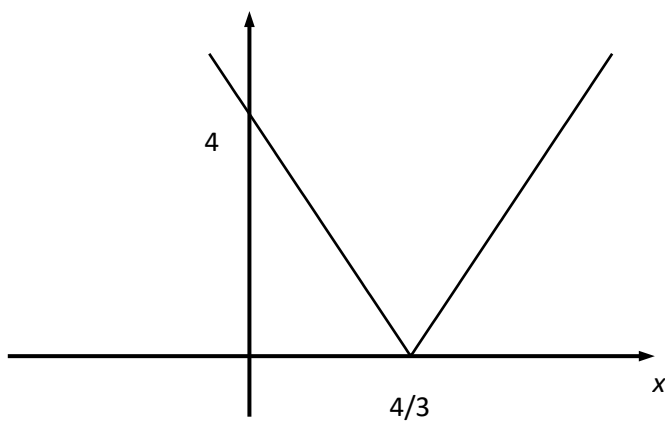
13. Show that the equation $\sqrt{x^3 + 4} - 2x - 1 = 0$ has at least one root between $x = 0$ and $x = 2$

AO1 Test for P3 Answers

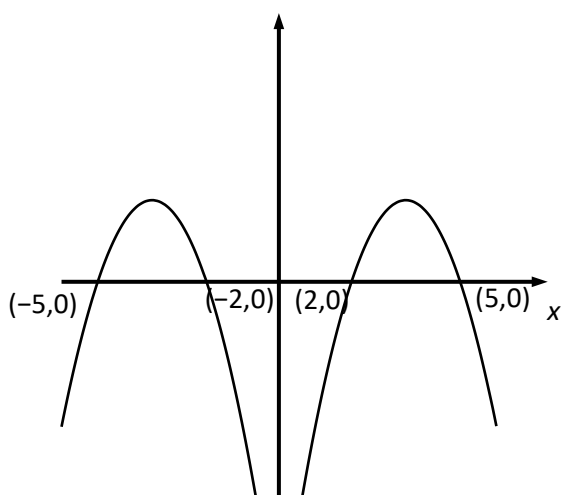
1. $\frac{3+2x}{(1-x)(1+x)^2}$

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

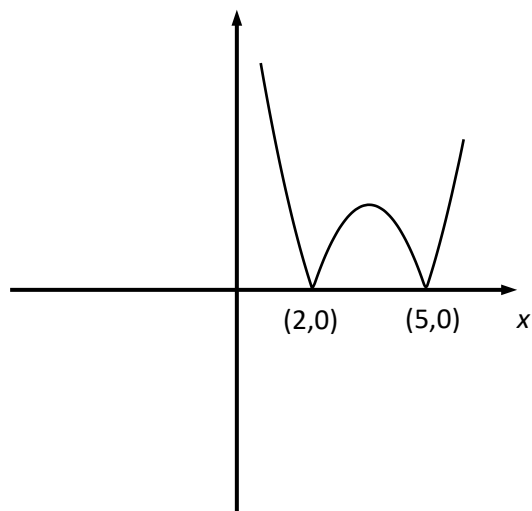
3.



4.(a)



(b)



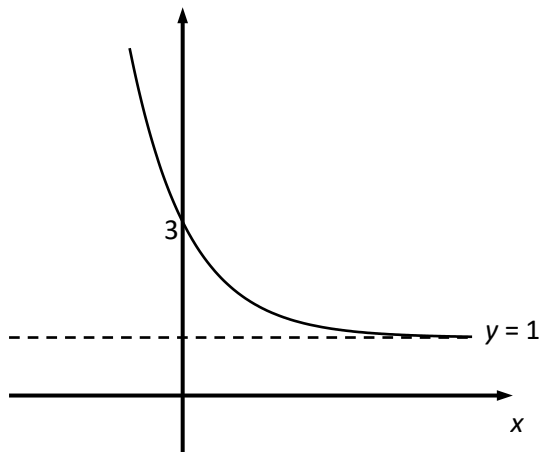
5. (a) $\sec x$ (b) $\sin^2 x$ (c) $\tan x^\circ$

6. (a) $\sec x$ (b) $-\cot \phi$

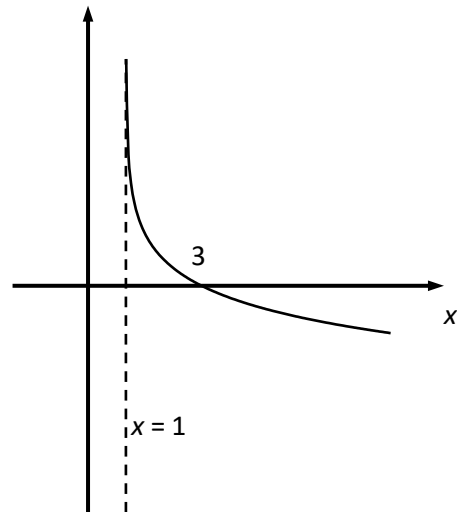
7. (a) $R = 5$, $\phi = \arccos(3/5) = 53.1^\circ$ (or 0.927 radians)

(b) $R = \sqrt{50}$ (or $5\sqrt{2}$), $\alpha = 45^\circ$ (or $\pi/4$ radians)

8. (a)



(b)



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