

1. Express the following functions in partial fraction form

(a) $\frac{7x - 26}{x^2 - 6x - 16}$

(b) $\frac{1}{x^4 - 16}$

2. (a) Show that $x^3 + 1 = (x + 1)P(x)$, where $P(x)$ is a polynomial of degree two. Find $P(x)$.

(b) Hence, find a partial fraction expansion of $\frac{x}{x^3 + 1}$.

3. Given that $\cos A = \frac{5}{13}$ and $\tan B = \frac{4}{3}$, where A and B are positive reflex angles, find the exact value of $\sin(A + B)$.

4. Given that $\tan A = \frac{1}{2}$, $\tan B = \frac{1}{3}$ and $\tan C = \frac{1}{4}$, find the exact value of $\tan(A + B + C)$

5. Two functions f and g are given by

$$f : x \rightarrow \frac{3}{ax - b}, x \neq \frac{b}{a}$$

$$g : x \rightarrow bx + a$$

where a and b are positive constants. Given that $f(1) = g(1)$ and $f(2)g(2) = 4$, find the value of a and b .

6. The functions f and g are defined by

$$f : x \rightarrow \frac{1}{x}, x \neq 0$$

$$g : x \rightarrow 1 - x$$

Write down an expression for $f \circ g(x)$ and $g \circ f(x)$, where $x \neq 0$ or 1 , and hence show that $g \circ f = f \circ g$.

7. On the same piece of paper, draw a graph of the following functions

(a) $\sin x$

(b) $2 \sin x$

(c) $2 \sin x + 3$

8. On the same piece of paper, draw a graph of the following functions

(a) $-\sin x$

(b) $1 - \sin x$

(c) $2 - \sin x$

9. (a) Express $5 \cos x - 12 \sin x$ in the form $R \cos(x + \theta)$, where R is a positive real number and θ is a positive acute angle.
- (b) Find the x and y intercepts of $5 \cos x - 12 \sin x$.
- (c) Find the minimum and maximum points of $5 \cos x - 12 \sin x$ and state where they occur.
- (d) Sketch the graph of $5 \cos x - 12 \sin x$.
10. The equation of a curve C is given by $y = |x|$.
- (a) Draw the curve C .
- (b) The curve D is produced by reflecting C around the line $x = 2$. By reflecting the curve draw in part (a), sketch the graph of D . Indicate all x and y intercepts.
- (c) Find the equation of curve D .
11. The equation of a curve C is given by $y = 1 - |x - 1|$.
- (a) Draw the curve C .
- (b) The curve D is produced by reflecting C around the line $x = 1$. By reflecting the curve draw in part (a), sketch the graph of D . Indicate all x and y intercepts.
- (c) Find the equation of curve D .