

Question 1: Expand and simplify: $(1 - x + x^3)^2$

[3]

Question 2: Express as a single simplified fraction: $\frac{c}{ab^2} + \frac{a}{bc} + \frac{b}{ac}$

[3]

Question 3: Factor completely: $8x^2 + 10x + 3$

[3]

Question 4: Find all solutions: $x^3 - 2x + 1 = 0$

[4]

Question 5: Simplify and express your answer using only positive exponents: $\left(\frac{3x^{3/2}y^3}{x^2y^{-1/2}}\right)^{-2}$

[3]

Question 6: Find an equation of the line that passes through the midpoint of $A(-7, 4)$ and $B(5, -12)$ and which is perpendicular to the line through these two points.

[4]

Question 7: Determine $\sin(7\pi/6) - \sec(5\pi/4)$. Express your answer as a single simplified fraction.

[3]

Question 8: Find all values of x in the interval $[0, 2\pi]$ for which $2 \sin(x) = \tan(x)$.

[4]

Question 9: If $\tan(\theta) = -3/4$ where $\frac{3\pi}{2} < \theta < 2\pi$ then determine $\csc(\theta)$.

[3]

Question 10: Express the area A of an equilateral triangle (that is, a triangle having all sides of equal length) as a function of the length x of one of its sides.

[4]

Question 11: Evaluate and simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$ where $f(x) = \frac{5}{x^2}$. Express your final answer as a single simplified fraction.

[4]

Question 12: Evaluate the limits:

(i) $\lim_{x \rightarrow 4} \frac{x^2 - 6x + 5}{x^2 - 4}$

[1]

(ii) $\lim_{x \rightarrow -2} \frac{\sqrt{x^2 + 5}}{x^2 - 4}$

[1]

Question 13: Evaluate the following limits, if they exist:

(a) $\lim_{x \rightarrow 0} \frac{x}{\sqrt{4+x} - \sqrt{4-x}}$

[3]

(b) $\lim_{x \rightarrow 3} \frac{x^2 - 6x + 9}{x^2 - 9}$

[3]

(c) $\lim_{x \rightarrow 2} \left(\frac{1}{x-2} - \frac{4}{x^2-4} \right)$

[4]