Pre-Calculus 12 Final Review Worksheet

Functions and Relations, Conics, Exponential & Logarithmic Functions, Trigonometry, Sequences & Series, Polynomial & Rational Functions

Part A: Functions and Relations

1. State the domain and range of the function $f(x) = \sqrt{3x - 6}$.
2. Determine whether the relation $x^2 + y^2 = 16$ is a function.
3. Given $f(x) = 2x + 1$, find $f^{-1}(x)$, the inverse function.
4. Identify the transformations applied to the base function $f(x) = x^2$ to obtain $g(x) = -2(x - 3)^2 + 4$.

Part B: Conics

5. Identify the conic and its characteristics: $x^2 + 4y^2 = 16$.
6. Write the equation of a parabola with vertex at (2, -1) and directrix $y = -3$.
7. Find the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$.

Part C: Exponential and Logarithmic Functions

8. Solve for x: $5^x = 125$.
9. Solve for x: $\log(x - 3) + \log(2) = 1$.
10. Determine the asymptotes of $f(x) = \log(x + 4) - 2$.

Part D: Trigonometry

11. Solve for θ in the interval $0° \leq \theta < 360°$: $\sin\theta = \frac{1}{2}$.
12. Simplify the expression: $\frac{1-\cos^2\theta}{\sin\theta}$.
13. State the amplitude and period of $f(x) = 3\sin(2x - \frac{\pi}{3})$.

Part E: Sequences and Series

14. Find the 10th term of the sequence: $a_n = 3n - 2$.
15. Determine the sum of the geometric series: $2 + 6 + 18 + \cdots$ to 5 terms.
16. Determine whether the sequence $5, 10, 20, 40, \ldots$ is arithmetic, geometric, or neither.

Part F: Polynomial and Rational Functions

17. Factor completely: $x^3 - 6x^2 + 11x - 6$.
18. Find the vertical and horizontal asymptotes of $f(x) = \frac{x^2-4}{x^2-x-6}$.
19. Sketch the graph of $f(x) = \frac{1}{x-2}$, indicating asymptotes.

Answer Key

1. Domain: $x \geq 2$; Range: $y \geq 0$
2. No, it fails the vertical line test.
3. $f^{-1}(x) = \frac{x-1}{2}$
4. Reflect over x-axis, vertical stretch by 2, right 3, up 4.
5. Ellipse, center (0,0), a = 2, b = 1
6. $(x-2)^2 = 4(y+1)$
7. $c = \sqrt{25-9} = 4$, foci at $(\pm 4, 0)$
8. $x = 3$
9. $\log(2(x-3)) = 1 \Rightarrow x = 6.5$
10. Vertical asymptote at $x = -4$, horizontal at $y = -2$
11. $\theta = 30°, 150°$
12. $\frac{1-\cos^2\theta}{\sin\theta} = \sin\theta$
13. Amplitude: 3, Period: π
14. $a_{10} = 3(10) - 2 = 28$
15. Sum: $2 \cdot \frac{3^5-1}{3-1} = 2 \cdot \frac{242}{2} = 242$
16. Geometric (multiplied by 2)
17. $(x-1)(x-2)(x-3)$
18. Vertical: $x = -2, x = 3$; Horizontal: $y = 1$
19. Hyperbola with vertical asymptote at $x = 2$ and horizontal at $y = 0$

Final Push

Keep reviewing until these questions feel natural. You've got this! Go ace that exam — your hard work is about to pay off.