

**AP CALCULUS PROBLEM SET 0 FUNCTIONS/RELATIONS
(NON-CALCULATOR)**

(June 92)

1. A rectangle with length three times its width is inscribed in the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$. Find the area of the rectangle.

(75-1)

2. Given the function f defined by $f(x) = \ln(x^2 - 9)$.

- (a) Describe the symmetry of the graph of f .
- (b) Find the domain of f .
- (c) Find all values of x such that $f(x) = 0$.
- (d) Write a formula for $f^{-1}(x)$, the inverse function of f , for $x > 3$

(Jan 94)

3. A cubic function contains the points $(-2, -6)$ and $(-4, -10)$ and has a double root at $x = -3$. Determine the equation, in factored form, of the function.

(Jan 94)

4. From a lighthouse, the range of visibility is 20 km. On a coordinate system where $(0, 0)$ represents the lighthouse, a ship is traveling on a path represented by $y = -2x + 30$. The ship can first be seen from the lighthouse at point A, and leaves the range of visibility at point B.
- (a) Determine the coordinates of A and B
- (b) If the ship is moving at a constant speed of 12 knots, determine the amount of time the ship is visible from the lighthouse. (1 knot is 1.852 km/h)

(Jun 94)

5. Solve: $(\log_2 x)^2 - 2\log_2 x - 8 = 0$

(77-1)

6. Let $f(x) = \cos x$ for $0 \leq x \leq 2\pi$ and let $g(x) = \ln x$ for all $x > 0$. Let S be the composition of g with f , that is, $S(x) = g(f(x))$.

- (a) Find the domain of S . (b) Find the range of S . (c) Find the zeros of S .

(Jun 86)

7. Solve, $0 \leq \theta \leq 2\pi$: $\cot \theta \tan 2\theta = 3$

(Jun 86)

8. Solve: $x^3 - 8x + 3 = 0$

(Jan 87)

9. Give the equation of an asymptote of the hyperbola $x^2 - 4y^2 - 10x + 24y - 27 = 0$.