Answer all of the questions. Show all work.

1. Sketch: \( x^2 + y^2 + x - 6y + 9 = 0 \).

2. Solve for \( x \): \( \log_3(x^2 - 7) - \log_3(x - 1) = 1 \).

3. Find \( \arccos\left(-\frac{\sqrt{3}}{2}\right) + \arctan\left(-\frac{\sqrt{3}}{3}\right) \).

4. Sketch: \( y = 5x^2 + 20x - 25 \). Indicate its vertex and all intercepts.

5. Given that \( f(x) = \frac{7x + 5}{2x - 3} \) is a one-to-one function, find its inverse.

6. Find the center and vertices for \( 4x^2 - 9y^2 - 16x - 18y - 29 = 0 \). Sketch the curve.

7. Verify the identity: \( \frac{1}{1 + \sin \theta} + \frac{1}{1 - \sin \theta} = 2 \sec^2 \theta \).

8. Let \( f(x) = 4x^2 - 7 \). Find and simplify \( \frac{f(x + h) - f(x)}{h} \).

9. Sketch: \( y = -3 \cos 2x \) in the interval \([0, 2\pi]\). Indicate all intercepts, its period and its amplitude.

10. Let angle \( A \) be in the third quadrant and let \( \tan A = 3/4 \). Find \( \cos 2A \).

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11. Solve for $x$: $4^{x^2+2} = 8^{x+2}$.


13. Find the term involving $x^4$ in $(3x^2 - y)^7$.

14. Find $\cot \left[ \arccos \left( -\frac{5}{13} \right) \right]$.

15. Evaluate: $\log_2 \sqrt{8} + (27)^{-2/3}$.

16. Let $f(x) = \sqrt{3 + x}$ and $g(x) = \frac{3x^2 - 9}{x^2}$. Find $g \circ f(x)$.

Let $y = 5x^2 + 20x - 25$. Indicate its vertex and all intercepts.

Given that $f(x) = \frac{7x + 5}{2x - 3}$ is a one-to-one function, find its inverse.

Find the center and vertices for $4x^2 - 9y^2 - 16x - 18y - 29 = 0$. Sketch the curve.

Verify the identity: $\frac{1}{1 + \sin \theta} + \frac{1}{1 - \sin \theta} = 2 \sec^2 \theta$.

Let $f(x) = 4x^2 - 7$. Find and simplify $\frac{f(x + h) - f(x)}{h}$.

Sketch: $y = -3 \cos 2x$ in the interval $[0, 2\pi]$. Indicate all intercepts, its period and its amplitude.

Let angle $A$ be in the third quadrant and let $\tan A = 3/4$. Find $\cos 2A$.

END OF EXAMINATION