Calculus—Worksheet #71

1. A railroad track and a road cross at right angles. An observer stands on the road 70 meters south of the crossing and watches an eastbound train traveling at 60 meters per second. At how many meters per second is the train moving away from the observer 4 seconds after it passes through the intersection?
   A) 57.60 B) 57.88 C) 59.20 D) 60.00 E) 67.40
2. If $y = 2x - 8$, what is the minimum value of the product xy ?
   A) -16 B) -8 C) -4 D) 0 E) 2
3. $\lim_{x \to 1} \frac{x}{\ln x}$ is A) 0 B) $\frac{1}{e}$ C) 1 D) e E) nonexistent
4. What are all values of x for which the function f defined by $f(x) = (x^2 - 3)e^{-x}$ is increasing?
   A) There are no such values of x. B) $x < -1$ and $x > 3$ C) $-3 < x < 1$ D) $-1 < x$ 3
   E) All values of x
5. If the region enclosed by the y–axis, the line $y = 2$, and the curve $y = \sqrt{x}$ is revolved about the y–axis, the volume of the solid generated is
   A) $\frac{32\pi}{5}$ B) $\frac{16\pi}{3}$ C) $\frac{16\pi}{5}$ D) $\frac{8\pi}{3}$ E) π
6. The area of the region enclosed by the graph of $y = x^2 + 1$ and the line $y = 5$ is
   A) $\frac{14}{3}$ B) $\frac{16}{3}$ C) $\frac{28}{3}$ D) $\frac{32}{3}$ E) 8^1
7. If $x^2 + y^2 = 25$. what is the value of $\frac{d^2y}{dx^2}$ at the point (4,3) ?
   A) $\frac{-25}{27}$ B) $\frac{-7}{27}$ C) $\frac{7}{27}$ D) $\frac{3}{4}$ E) $\frac{25}{27}$
8. $\int_0^{\frac{1}{4}} \frac{e^{\tan x}}{\cos^2 x} dx$ is A) 0 B) 1 C) e – 1 D) e E) e + 1
9. If $f(x) = \ln |x^2 - 1|$, then $f'(x) =$
   A) $\left|\frac{2x}{x^2 - 1}\right|$ B) $\frac{2x}{|x^2 - 1|}$ C) $\frac{2|x|}{x^2 - 1}$ D) $\frac{2x}{x^2 - 1}$ E) $\frac{1}{x^2 - 1}$
10. Let f be a differentiable function such that $f(3) = 2$ and $f'(3) = 5$. If the tangent line to the graph of f at $x = 3$ is used to find an approximation to a zero of f, that approximation is A) 0.4 B) 0.5 C) 2.6 D) 3.4 E) 5.5