

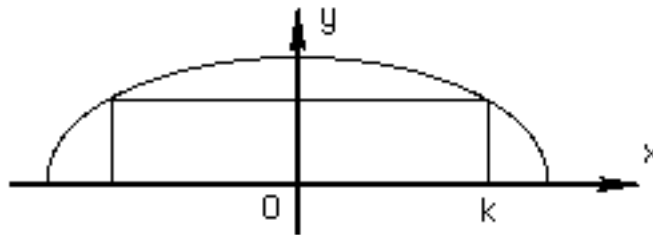
CALCULUS I – Worksheet #60

1. (Free Response) Water is draining at the rate of 48π ft³/minute from a conical tank whose diameter at its base is 40 feet and whose height is 60 feet.
- Find an expression for the volume of water in the tank in terms of its radius.
 - At what rate is the radius of the water in the tank shrinking when the radius is 16 feet?
 - How fast is the height of the water in the tank dropping at the instant that the radius is 16 feet?

2. The slope of the line tangent to the graph of $y = \cos(2x)$ at $x = \frac{\pi}{7}$ is:
- A) -1.564 B) -0.782 C) -0.031 D) 0.657 E) 0.782

3. The area of the region enclosed by the graphs of $y = 7$, $x = 0$, and $y = 2^x$ is closest to:
- A) 9.0 B) 9.5 C) 10.0 D) 10.5 E) 11.0

4. The slope of the line tangent to the graph of $y = e^{-x}$ at $x = 4$ is
- A) 0.050 B) 0.018 C) -0.007 D) -0.018 E) -0.050



5. A rectangle of length $2k$ is inscribed in the region between the x -axis and the graph of $y = \cos x$, as shown in the figure above. The value of k that maximizes the area of the rectangle is:
- A) 0.5000 B) 0.785 C) 0.860 D) 0.866 E) 6.280

6. Which of the following are antiderivatives of $\frac{\ln^2 x}{x}$?

I. $\frac{\ln^3 x}{3}$ II. $\frac{\ln^3 x}{3} + 6$ III. $\frac{2\ln x - \ln^2 x}{x^2}$

- A) I only B) III only C) I and II only D) I and III only E) II and III only

7. If r is positive and increasing, for what value of r is the rate of increase of r^3 twelve times that of r ?
- A) $\sqrt[3]{4}$ B) 2 C) $\sqrt[3]{12}$ D) $2\sqrt{3}$ E) 6