

CALCULUS I – Worksheet #64

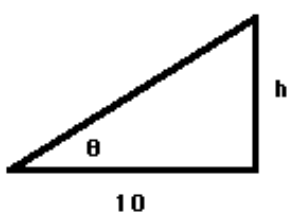
1. (Free Response – calculator OK) Let R be the region bounded by $y = 2x^2 - 8x + 11$ & $y = x^2 - 4x + 10$.
- Sketch the region, R.
 - Determine the area of R.
 - Determine the volume when R is rotated about the y-axis.
 - The line $x = k$ divides the region R into two regions such that when these two regions are rotated about the y-axis, they generate solids with equal volume. Find the value of k.

2. If $f(x) = \tan^2 x + \sin x$, then $f' \left(\frac{\pi}{4} \right) =$ A) $\frac{4 + \sqrt{2}}{2}$ B) $\frac{2 + \sqrt{2}}{2}$ C) $\frac{8 + \sqrt{2}}{2}$ D) $\frac{8 - \sqrt{2}}{2}$ E) $\frac{4 - \sqrt{2}}{2}$

3. Which of the following are antiderivatives of $f(x) = \cos^3 x \sin x$?
- I. $F(x) = \frac{-\cos^4 x}{4}$ II. $F(x) = \frac{\sin^2 x}{2} - \frac{\sin^4 x}{4}$ III. $F(x) = \frac{1 - \cos^4 x}{4}$
- A) I only B) II only C) III only D) I and III only E) I, II, and III

4. The function f is given by $f(x) = 3e^{\sin x}$. f is decreasing over which interval?
- A) $[0, \pi]$ B) $\left[\frac{\pi}{2}, \frac{3\pi}{2} \right]$ C) $\left[\frac{\pi}{2}, \frac{3\pi}{2} \right]$ D) $\left[\frac{3\pi}{2}, \frac{5\pi}{2} \right]$ E) $[-\infty, \infty]$

5. $\int_1^{e^2} \left(\frac{\ln^2 x}{x} \right) dx =$ A) $\frac{7}{3e^2}$ B) $\frac{4}{e^2}$ C) 2 D) $\frac{7}{3}$ E) $\frac{8}{3}$



6. In the triangle shown above, Θ is increasing at a constant rate of $\frac{15}{26}$ radians per minute. At what rate is the area of the triangle increasing, in square units per minute, when h is 24 units.
- A) $\frac{338}{5}$ B) 39 C) $\frac{195}{4}$ D) 182 E) 195

x	0	1	2	3	4	5	6
f(x)	1	2	4	1	3	2	5

7. A table of values for a continuous function f is shown above. If three equal subintervals are used for $[0,6]$, which of the following is equivalent to a right-hand Riemann Sum approximation for $\int_0^6 f(x) dx$?
- A) 14 B) 17 C) 20 D) 24 E) 27

8. Let f be defined as follows: $f(x) = \begin{cases} x^2 & x \leq 0 \\ \sqrt{x} & x > 0 \end{cases}$ Let $g(x) = \int_{-2}^x f(t) dt$.

For what value of $x \neq -2$ would $g(x) = 0$? A) 0 B) $\sqrt{2}$ C) 2 D) $2\sqrt{2}$ E) $2\sqrt{2}$