CALCULUS II – Worksheet #7

1. If $\frac{dy}{dx} = \sqrt{x}$, then the average rate of change of y with respect to x on the closed interval [0, 4] is A) $\frac{1}{16}$ B) 1 C) $\frac{4}{3}$ D) $\sqrt{2}$ E) 2

2. The region bounded by the x–axis and the part of the graph of y = sinx, between x = 0 and x = π is separated into two regions by the line x = p . If the area of the region for $0 \le x \le p$ exceeds the area of the region for $p \le x \le \pi$ by one square unit, then p =
A) $\arccos \frac{1}{4}$ B) $\arccos \frac{1}{3}$ C) $\frac{\pi}{4}$ D) $\frac{\pi}{3}$ E) $\frac{2\pi}{3}$

3. $\int \frac{1}{x^2 + x}\, dx =$ A) $\frac{1}{2}\arctan(x + \frac{1}{2}) + C$ B) $\ln|x^2 + x| + C$ C) $\ln\left|\frac{x+1}{x}\right| + C$
D) $\ln\left|\frac{x}{x+1}\right| + C$ E) none of these

4. Let R be the region in the first quadrant enclosed by the graphs of y = x cos x , x=0, and x = k for $0 < k < \frac{\pi}{2}$. The area of R, in terms of k, is A) k sin k + cos k – 1 B) –k cosk + sin k C) –k sin k + cos k – 1
D) k sin k – cos k + 1 E) –k sin k – cos k + 1

5. If $e^{g(x)} = 2x + 1$, then g ' (x) =
A) $\frac{1}{2x+1}$ B) $\frac{2}{2x+1}$ C) 2(2x + 1) D) e^{2x+1} E) ln (2x + 1)

6. Which of the following three improper integrals converge?
I. $\int_0^\infty \frac{1}{1+x^2}\, dx$ II. $\int_1^\infty \frac{1}{x^2}\, dx$ III. $\int_0^1 \frac{1}{x}\, dx$
A) II only B) I and II only C) I and III only D) II and III only E) I, II and III

7. Find the area bounded by $f(x) = x^3$, x = 1, x = 3, and y = 0 using two left-endpoint rectangles.
A) 20 B) 9 C) 35 D) 22 E) None of these.

8. Use the 4 segments of equal length on [1,3] as bases of rectangles which have vertices on the graph $y = x^2$ and all other points below the graph to approximate the area bounded by $y = x^2$, y = 0, x = 1, and x = 3. The approximate area is:
A) 18.75 B) 6.75 C) 10.75 D) 10 E) 7.5

9. Let $f(x)$ be a continuous function on [c,d]. If $\int_d^c f(x)\, dx = k$, then the average value of $f(x)$ on [c,d] is:
A) –k B) k(d – c) C) $\frac{k}{d-c}$ D) $\frac{k}{c-d}$ E) –k(d – c)