Calculus I – Show Your Work Problems

Module 7:

1. Estimate the area under the graph of $f(x) = 1/(1+x^2)$ for $-2 \leq x \leq 2$, using 4 approximating rectangles and taking the sample points to be the right hand endpoint.

2. The speedometer reading for a motorcycle at 12-second intervals are given in the table.

t in sec	0	12	24	36	48	60
v in ft/s	30	28	25	22	24	27

Estimate the distance traveled by the motorcycle during this time period using the velocities at the beginning of the time interval.

3. Express the limit as a definite integral on the given interval. Do not evaluate the definite integral.

$$\lim_{n\to\infty} \sum_{i=1}^{n} [5 + 8(x_i^*)^2 - 7(x_i^*)^4]\Delta x \qquad [0, 3]$$

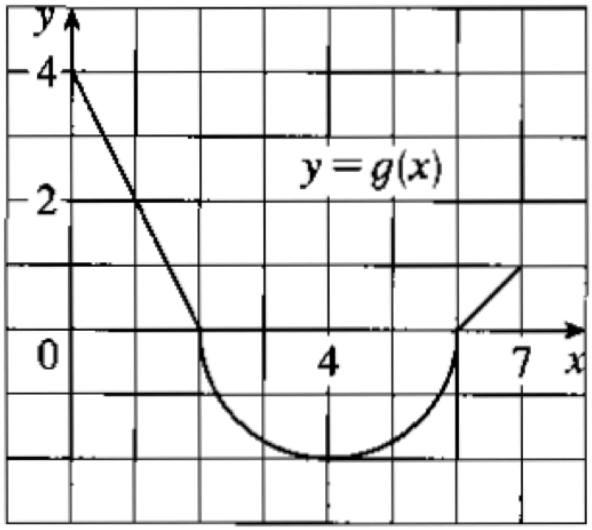
4. Use the properties of definite integrals to complete the following equations. Assume that that f is a continuous function over the entire real numbers.

a. $\int_{2}^{2} f(x)dx =$ _____

b. $\int_{1}^{5} f(x)dx =$ _____ (switch the limits of integration)

c. $\int_{1}^{3} f(x)dx + \int_{3}^{8} f(x)dx =$ _____ (write a single definite integral)

5. Given the graph of the function, y = g(x). It consists of two straight lines and a semicircle



Use this graph and/or properties of the definite integral to evaluate the following integrals

a. $\int_0^2 g(x)dx$

b. $\int_2^6 g(x)dx$

c. $\int_0^7 g(x)dx$

6. Find the most general antiderivative for $f(x) = 6x^2 - 7 \sin x$.

7. Use the Fundamental Theorem of Calculus Part 1 to find g'(x) where

$$g(x) = \int_1^x \frac{t}{2+t^2}\,dt$$

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8. Use the Fundamental Theorem of Calculus Part 1 to find g'(x) where

a. $$g(x) = \int_1^x \frac{t}{2+t^2}\,dt$$

b. $$g(x) = \int_1^{\sin x} \frac{t}{2+t^2}\,dt$$

9. Evaluate the following indefinite or definite integral.

a. $$\int (1+\tan x)^5 \sec^2 x\,dx$$

b. $$\int_0^1 x^2(1+3x^3)^4\,dx$$