PS 2Due Wednesday 2781 at the start of class

211

Name

Problems on colored paper are no calculator.

A trough is 5 feet long, and its vertical cross sections are inverted isosceles triangles with base 2 feet and height 3 feet. Water is being sip

honed out of the trough at the rate of 2 cubic feet per minute. At any time t, let h be the depth and V be the volume of water in the trough.



 $v = \frac{1}{2}bhH$

- a. Find the volume of water in the trough when it is full. (1 point)
- b. What is the rate of change in h at the instant when the trough is ¼ full by volume? (4 points)

c. What is the rate of change in the area of the surface of the water at the instant when the trough is ¼ full by volume? (4 points)

2.3 points each

Consider the curve defined by $2y^3 + 6x^2y - 12x^2 + 6y = 1$. a. Show that $\frac{dy}{dx} = \frac{4x - 2xy}{x^2 + y^2 + 1}$.

- b. Write an equation of each horizontal tangent line to the curve.
- c. The line through the origin with slope -1 is tangent to the curve at point P. Find the x- and y-coordinates of point P.



The graph of the velocity v(t), in ft/sec, of a car traveling on a straight road, for 0 < t < 50, is shown above. A table of values for v(t), at 5-second intervals of time t, is shown to the right of the graph.

a. During what intervals of time is the acceleration of the car positive? Give a reason for your answer. (2 points, just a correct answer -1 point)

b. Find the average acceleration of the car, in ft/sec^2 , over the interval 0 < t < 50. (1 point)

c. Find one approximation for the acceleration of the car in ft/sec2, at t = 40. Show the computations you used to arrive at your answer. Hint: This is the same as b, just on a smaller interval (2 points, just a correct answer -1 point)

d. Approximate the integral from 0 to 50 of v(t) dt with a Riemann sum, using the midpoints of five subintervals of equal length. Using correct units, explain the meaning of this integral. (4 points. – 1 point if no correct units or explanation about what the value represents.)

3.