

Name \_\_\_\_\_

**You may work with others, but each student should turn in a separate quiz.**

1. (4 points) Complete each boxed equation with an appropriate formula.

(a) If  $y = 3^t + 4e^t - 5 \ln(t)$ , then  $\frac{dy}{dt} =$

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(b) If  $w = e^{3x^7 - 5x^2 + 9}$ , then

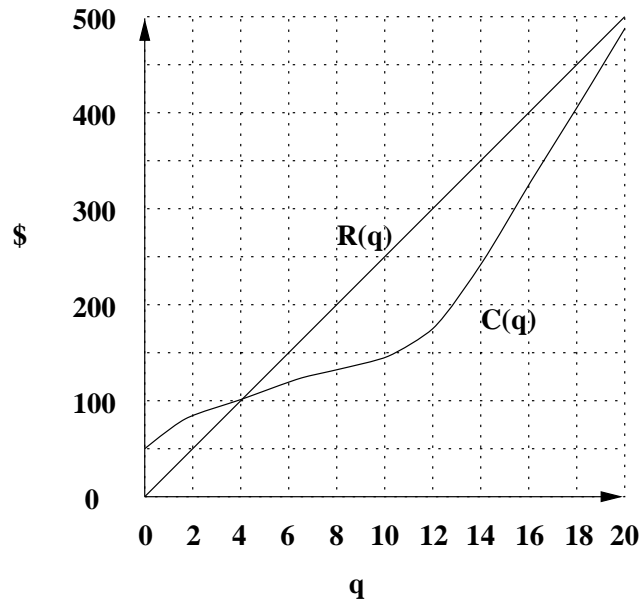
$$\frac{dw}{dx} =$$

(c) If  $h(t) = \sqrt{5t^4 + 3t^2 + 7}$ , then

$$h'(t) =$$

2. (2 points) In last week's edition of the *Free Times*, there was an article about the *Cerulean Warbler*. Suppose that the population of this species of bird in South Carolina can be approximated by  $P(t) = 500(0.96)^t$ , where  $t$  represents the number of years since 1972.
- (a) In the year 2002, how many Cerulean Warblers are living in South Carolina? Round off your answer to the nearest integer.
- (b) In the year 2002, how quickly is the population of Cerulean Warblers declining in South Carolina? Give your answer in units of *birds per year*, and be sure that your answer is accurate to at least one place after the decimal point.

3. (4 points) The cost and revenue functions for a T-shirt company are graphed below.



- (a) At what quantity of T-shirts does this company reach its break-even point?
- (b) At the break-even point for this company, which is greater – the marginal revenue or the marginal cost?
- (c) At a production level of 16 T-shirts, which is greater — the marginal revenue or the marginal cost?
- (d) How many T-shirts are produced and sold when the company attains its maximum profit?  
What is the dollar amount of this maximum profit?