

1. Given the price-demand function for Cora Jo's Computers is  $p = e^{10 - \frac{1}{5}x}$ , find the price which maximizes revenue. Round your answer to the nearest cent.

2. Evaluate the following expression, where  $a$  is a positive constant:  $\int_{-1}^4 (12a)x^2 dx$

3. Find the exact value of  $\int_5^8 \frac{x}{\sqrt{9-x}} dx$ , using substitution. Note: You may check your answer with *fnInt*, but to get full credit you must show the correct steps.

4.  $\int \left( 8e^x + 4\pi + 12\sqrt{x} + \frac{1}{x} \right) dx$

5. Find the cost function if the marginal cost is defined by  $630x - 0.25e^x + 125$ , where  $x$  is the number of items sold and there are fixed costs of \$4500.

6. a.  $\int \frac{10x + 90}{x^2 + 18x} dx$

b.  $\int 2x \cdot 9^{x^2+1} dx$

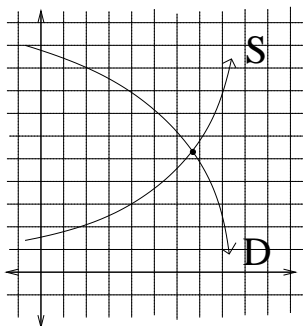
7. Given  $f(x) = -2x^3 - 12x^2 - 18x - 4$ , find the absolute extrema on the interval  $[-5, 0]$ .

8. Write a definite integral, or a sum of integrals, that defines the area bounded by the curves  $y_1 = x^2 + 4x + 5$  and  $y_2 = 8 - x - x^2$  on the interval  $[-5, 0]$ . DO NOT EVALUATE!

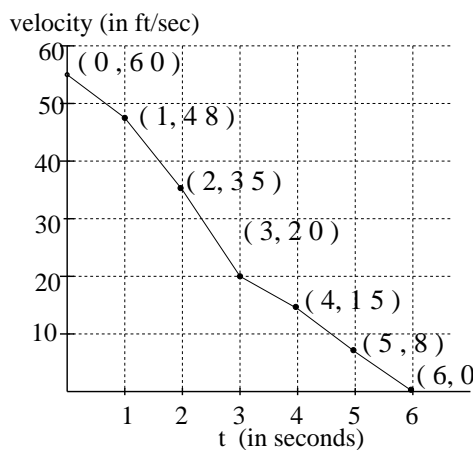
9. If the supply and demand functions for Nancy's Nuts is  $p = S(x) = 3x^2 + 40$  and  $p = D(x) = 220 - 2x^2$ ,

a. write the definite integral that would be used to find the consumers' surplus at market equilibrium.

b. find the consumers' surplus at market equilibrium.



10. A person slams on the brakes of an automobile. The graph below gives the velocity at 1 second intervals. Estimate the distance traveled during the six-second interval it took the driver to stop, using right hand sums, and three rectangles:  $R_3$ . Is this approximation, higher or lower than the exact distance traveled in 6 seconds? Show your calculations, not just the answer.



11. Find the interval(s) over which  $f(x)$  is concave up, if any exist, when  $f(x) = -2x^3 + 6x^2 - ax + b$ .  $a > 0$  and  $b > 0$ .

12. The value of the Smith's home over the last 40 years since they built it in 1965 is defined by  $V(x) = 1.85x^4 - 125.3x^3 + 2316x^2 - 6480x + 85,000$ , where  $x$  is the number of years since they built the house. What is the average value of the house from 1995 to 2000? Round your answer to the nearest dollar.

13. Which of the following is ALWAYS true: If  $f'(x)$  has an intercept at  $(2, 0)$ , then

- a.  $f(2) = 0$
- b.  $f(x)$  has a critical point at  $x = 2$ .
- c.  $(2, 0)$  is an inflection point for  $f(x)$ .
- d.  $f(x)$  has an absolute maximum at  $x = 2$ .
- e. None of these is ALWAYS true.

Additional space for any of the previous problems. Be sure to label and box the work, if you want it graded.