Section 5.5, Day 2
Fundamental Theorem of Calculus

1. A company is collecting natural gas from a field at the rate of $R(t) = \frac{4.5t}{1.5t^2+2}$ million cubic feet per year t years from now. How much natural gas will this company produce over the next 4 years?

2. The marginal cost $C'(q)$ (in dollars per unit) of producing q units is given in the following table.

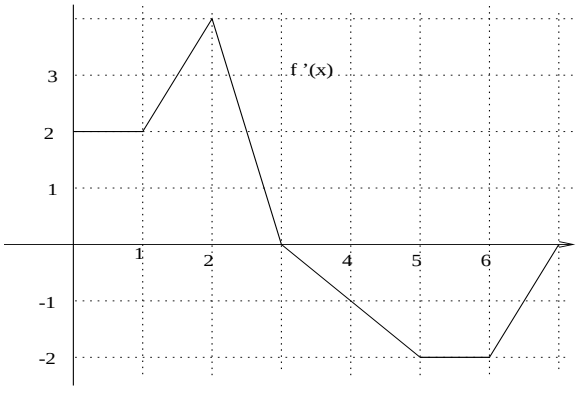
q	0	100	200	300	400	500	600
C'(q)	25	20	18	22	28	35	45

   (a) Find the best-fitting regression function for the marginal cost of this product. Record your function here: $C'(q) =$ _____

   (b) If the fixed cost is \$10,000, find the total cost of producing 400 units.

   (c) How much would the total cost increase if production were increased one unit, to 401 units?

3. The figure below is $f'(x)$. Given that $f(0) = 1$, find $f(1)$, $f(2)$, $f(3)$, and $f(6)$.



4. The estimated rate at which banks were failing between 1982 and 1994 is given by $f(t) = 0.063t^4 - 1.953t^3 + 14.633t^2 - 6.685t + 47.459$ for $0 \leq t \leq 12$, where $f(t)$ is the number of banks per year and t is measured in years, with $t = 0$ corresponding to the beginning of 1982. What is the highest rate of bank failures during the period in question?

5. Due to the increasing cost of fuel, the manager of the City Transit Authority estimates that the number of commuters using the city subway system will increase at the rate of

$$3000(1 + 0.4t)^{-1/2}$$

per month, t months from now. If 100,000 commuters are currently using the system, find an expression giving the total number of commuters who will be using the subway t months from now. How many commuters will be using the subway 6 months from now?