1. Find the value of \( b \) that makes each definite integral a true statement.

a. \( \int_{1}^{b} 4 \, dx = 8 \)  
   b. \( \int_{b}^{3} 2x \, dx = 8 \)  
   c. \( \int_{1}^{b} \frac{1}{x^2} \, dx = \frac{4}{5} \)  
   d. \( \int_{1}^{b} 3\sqrt{x} \, dx = 126 \)

2. Evaluate.

a. \( \int_{1}^{3} 3t^2 + 7 \, dt \)  
   b. \( \int_{1}^{2} 4t^3 - 1 \, dt \)  
   c. \( \int_{1}^{8} \sqrt[3]{x} - 2 \, dx \)

   d. \( \int_{-2}^{3} e^{-t} \, dt \)  
   e. \( \int_{0}^{1} 2xe^{x^2} \, dx \)  
   f. \( \int_{0}^{6} e^{-x} \, dx \)

   g. \( \int_{1}^{x} \frac{2x+1}{x^2 + x - 1} \, dx \)  
   h. \( \int_{0}^{12} x\sqrt{1-x^2} \, dx \)  
   i. \( \int_{0}^{1} x(x^2 + 1)^5 \, dx \)

3. Find the area under the curve \( f(x) = 4 - x^2 \) on \([-2, 2]\).

4. a. Find the accumulated change in the function \( f(x) = x^2 - x \) on \([0, 2]\).

   b. Find the area between the x-axis and the curve \( f(x) = x^2 - x \) on \([0, 2]\).

   c. Why are the answers different for 4a and 4b?

5. A particle is released during an experiment. Its speed \( t \) minutes after release is given by \( v(t) = -0.3t^2 + 9t \) where \( v(t) \) is in meters per minute.

   a. How far does the particle travel during the first 10 minutes? \([0, 10]\)

   b. How far does the particle travel during the second 10 minutes? \([10, 20]\)

6. ProArt, Inc. determines that its marginal cost per day is given by \( C(t) = 75 - 3t \) dollars per day. Find the total accumulated cost, in dollars, for the first 10 days.
Key

1. a. b = 3    b. b = 1    c. b = 5    d. b = 16
2. a. 40          b. 14          c. -11/4          d. $-e^{-3} + e^2 = 7.339$
     e. $e - 1$
     f. $1 - e^{-6}$
     g. ln(19)
     h. 4
     i. 21/4

3. 10 2/3

4. a. 2/3          b. 1/6 + 5/6 = 1          c. The graph has values above and below the axis on the interval. When finding the accumulated change, those values are counted as negatives, -1/6 + 5/6 which results in an overall change of 4/6 = 2/3. When finding the area, regions below the axis count positively and so you have 1/6 + 5/6 = 1.

5. a. 350 m        b. 650m

6. $600$