

Mathematics 122 Test #1

Name: _____

You are to use your own calculator, no sharing.

Show your work to get credit.

(1) (15 points) The variables p and q are related is in the table $\frac{p}{q} \begin{array}{|c|c|c|c|c|} \hline & 1 & 3 & 5 & 7 \\ \hline & 11 & 7 & 3 & -1 \\ \hline \end{array}$

(a) Explain why the relation between p and q could be linear.

(b) Find q as a function of p .

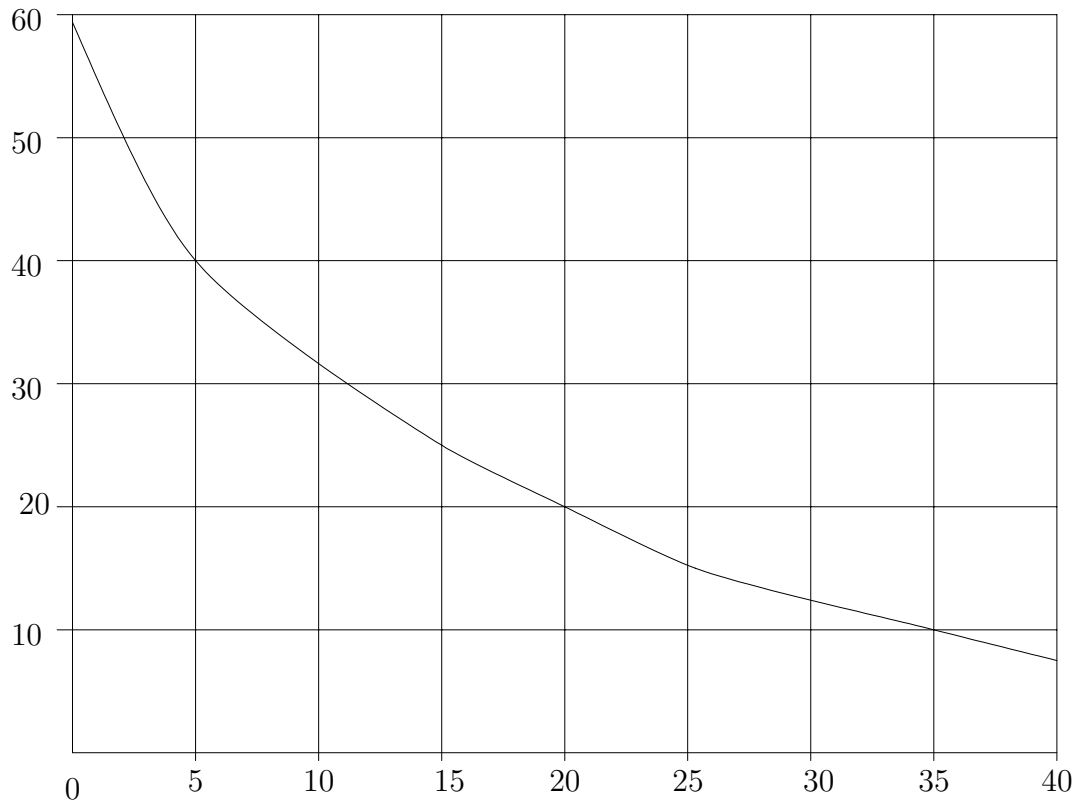
(c) What if the value of p when $q = 8$?

(2) (10 points) Let $f(x) = x^2$.

(a) What is the average rate of change of $f(x)$ between $x = 1$ and $x = 1.1$?

(b) What is the average rate of change of $f(x)$ between $x = 1$ and $x = 1 + h$? Simplify your answer.

(3) (10 points) Let $y = f(x)$ be given by the following graph.



(a) Estimate the average rate of change between $x = 5$ and $x = 20$.

(b) Estimate the instantaneous rate of change of $f(x)$ when $x = 15$.

$f'(15) =$ _____

(4) (10 points) Let $f(x) = x2^x$

(a) Estimate the derivative of $f(x)$ when $x = 3$.

$f'(3) =$ _____

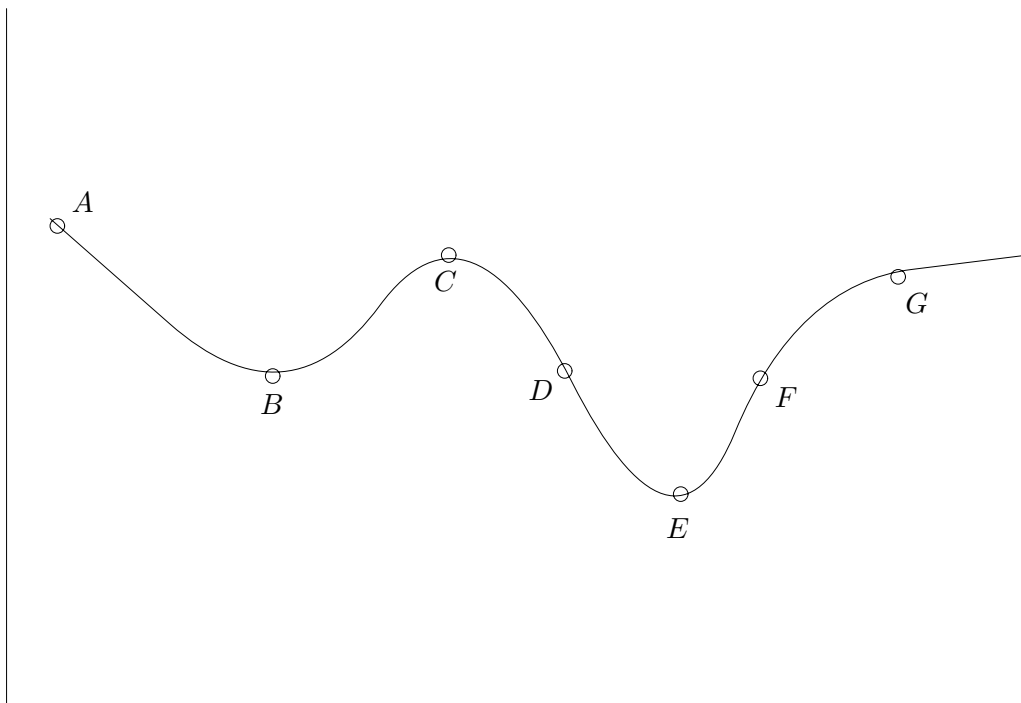
(b) What is the equation of the tangent line to $y = f(x)$ at point where $x = 3$?

- (5) (5 points) If \$1000.00 is invested at 8% interest compounded quarterly how many years does it take to become \$10,000.00?

- (6) (10 points) \$500.00 is invested at 10% compounded continuously.
(a) Give a formula for the value of the principle P after t years.

- (b) How long does it take the investment to double?

- (7) (10 Points) Let $y = f(x)$ have the following graph.



- (a) For which of the labeled points is $f'(x) > 0$?
(b) For which of the labeled points is $f'(x) < 0$?
(c) For which of the labeled points is $f'(x) = 0$?
(d) At which of the labeled points is $f'(x)$ the largest?

(8) (10 points) The table below shows the w (in pounds) of a puppy at age t (in weeks)

| | | | | | |
|-----|-----|------|------|------|------|
| t | 0 | 2 | 4 | 6 | 8 |
| w | .64 | 1.74 | 2.46 | 4.58 | 6.43 |

(a) What is the average rate of change in the weight of the puppy between the 2nd and 6th week?

(b) Estimate the instantaneous rate of change of the weight of the puppy when it is 6 weeks old.

$$w'(6) = \underline{\hspace{2cm}}$$

(c) What are the units of $w'(6)$?

(9) (15 points) Let $A(t)$ have the values

| | | | |
|--------|----|---|------|
| t | 0 | 1 | 2 |
| $A(t)$ | 12 | 9 | 6.75 |

(a) Explain why this could come from an exponential function.

(b) Assuming $A(t)$ is exponential give a formula for $A(t)$.

$$A(t) = \underline{\hspace{2cm}}$$

(c) What is the half life of $A(t)$?

(10) (10 points) If the graph is of $y = f(x)$, draw the graph of $y = f'(x)$ on the same axis.

