1. (10 points.) A runner starts her workout by jogging slowly for 10 minutes. She then runs fast for 20 minutes but then catches up with a friend who is a slow runner. She runs with him for 15 minutes then as a warm down walks for the final 5 minutes of her workout. Draw a graph of here speed as a function of the time in minutes after she started her workout.

![Graph](image-url)
2. (10 points) The following is a graph of $r$ as function of $p$.

(a) What is the value of $r$ when $p = 35$?

(b) For what values of $p$ is $r = 10$?

(c) What is the average rate of change of $r$ with respect to $p$ between $p = 20$ and $p = 35$?
3. (5 points) Find the slope, $x$-intercept, and $y$-intercept of the line $3x + 4y - 9 = 0$

Slope = \\
$x$-intercept = \\
y-intercept = \\

4. (5 points) Find the equation of the line through $(1, -2)$ with slope $\frac{1}{2}$. \\


5. (10 points) Corresponding values of $p$ and $q$ are given by the table:

<table>
<thead>
<tr>
<th>$p$</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$q$</td>
<td>1</td>
<td>4</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

Assuming that the relationship between $p$ and $q$ is linear

(a) Find $q$ as a linear function of $p$

(b) Find $p$ as a linear function of $q$

(c) Find the value of $p$ when $q = 20$

$p =$
6. (15 points) In 1990 there were 500 acres of kudzu growing in Richland county and by 1995 this had increased to 720 acres.
(a) What is the average rate of change in the number of acres of kudzu between 1990 and 1995? Give the units on your answer.

(b) Predict how many acres of Kudzu will be growing in Richland county in the year 2000.

(c) Make a prediction of what year there will be 1000 acres of kudzu in Richland county.
7. (10 points) The cost function for a company to produce a quantity \( q \) of some item is \( C(q) = 5000 + 3q \) dollars. The revenue function for selling a quantity \( q \) so the item is \( R(q) = 7q \) dollars.

(a) What are the fixed costs to the company in producing the items?

(b) At what price per item is the company selling the items?

(c) How many items must the company sell to start to make a profit?
8. (10 points) Use your calculator to find a solution to $p^5 + 2p - 4 = 0$ accurate to two decimal places. Write a sentence explaining how you used the calculator in solving the problem.
9. (10 points) The following table gives the some of the values of an exponential function $y = f(x)$.

<table>
<thead>
<tr>
<th>$x$</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f(x)$</td>
<td>2.10</td>
<td>1.47</td>
<td>1.03</td>
<td>.720</td>
</tr>
</tbody>
</table>

(a) What is the factor by which $f(x)$ changes when $x$ is increased by 1?

(b) What is the value of $y$ when $x = 0$?

$$f(0) = \underline{\text{}}$$

(c) What is a formula for $y = f(x)$ as a function of $x$?

$$f(x) = \underline{\text{}}$$
10. (15 points) A group of 35 rabbits is released on an island. It is found that this population of rabbits increases at 20% per year.
   (a) What is a formula for the number of rabbits after $t$ years?

   (b) What is the number of rabbits after 50 years?

   (c) How long does it take for the number of rabbits to double?