1. A water tank drains at a rate of \( r(t) = \frac{2}{t} \) gallons per minute, \( t \) minutes after the plug is pulled.
   a. Sketch a graph of \( r(t) \) over the interval from \( t=0 \) to \( t=6 \). Label the axes.
   
   b. The units on the width of the region between \( r(t) \) and the \( t \)-axis are 
   
   c. The units on the height of the region between \( r(t) \) and the \( t \)-axis are 
   
   d. The exact area of the region between \( r(t) \) and the \( t \)-axis from \( t=0 \) to \( t=6 \) is 
   
   e. Interpret the area in context.

2. The rate of change in car sales (in hundred cars per month) is modeled by \( C(t) \), where \( t \) is the number of months after December 2001.
   a. What does the area of the region between the graph of \( C \) lying above the \( t \)-axis and the \( t \)-axis represent?
   
   b. What are the units on
   i. the width of this region?
   ii. the height of this region?
   iii. the area of this region?
Math 2123 - Math Center Worksheet
Section 5.2

1. A small college is looking at data on the sale of tickets to their home football game. The following data show the rate of change in the sale of tickets for a given price.

<table>
<thead>
<tr>
<th>Ticket price (dollars)</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROC of Sales (tickets per dollar)</td>
<td>183</td>
<td>138</td>
<td>103</td>
<td>79</td>
<td>58</td>
<td>45</td>
<td>33</td>
</tr>
</tbody>
</table>

a. Write a complete exponential model for the data.

b. Use 3 right rectangles to estimate the change in sales when the ticket price increases from $10 to $40.

c. Use 5 midpoint rectangles to approximate the area between the graph of the model you generated in part a and the price axis on the interval [15, 30].

d. Write an interpretation of your answer to part c.
2. Suppose that the rate of flow of revenue for a company can be modeled by
\[ r(x) = 2.58x^3 - 10.44x^2 - 5.62x - 15.95 \] million dollars per year where \( x \) is the
number of years after 1990.

a. Use the idea of a limit of sums to calculate \( \int_2^4 r(x) \, dx \). Continue doubling \( N \), the
number of rectangles, in the following table until the approximation is accurate to the
nearest tenth.

<table>
<thead>
<tr>
<th>( N )</th>
<th>Midpoint Approximation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

\[ \int_2^4 r(x) \, dx \approx \underline{\text{___________}}. \]

b. Write an interpretation of your answer to part a.
1. Evaluate the following indefinite integrals:

   a. \( \int \frac{1}{9t^3} \, dt \)

   b. \( \int e^t \, dy \)

   c. \( \int 5\sqrt{x} \, dx \)

2. The rate of change of the number of Campbell Soup employees from 1990 through 1998 can be described by \( s(t) = -0.689t^2 + 4.665t - 7.107 \) thousand employees per year, \( t \) years after 1990. In 1993, there were 23,800 people employed by Campbell Soup. Recover the model for the number of Campbell Soup employees.