1. (a) Find the equation of the line through (3,4) and (8,2). (4 pts)

(b) Write the horizontal-intercept and vertical-intercept. (2 pts ea)
   - horizontal-int=
   - vertical-int=

(c) Graph the line. (4 pts)

2. Find the equation of the line with vertical-intercept of 5 and slope of 2. (4 pts)
3. Data was taken as an orange fell from a tall building.

<table>
<thead>
<tr>
<th>Velocity(ft/sec)</th>
<th>7.9</th>
<th>11.3</th>
<th>13.8</th>
<th>16.0</th>
<th>17.9</th>
<th>22.7</th>
<th>25.4</th>
<th>31.0</th>
<th>35.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance(ft)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

(a) Find a formula for distance as a function of the velocity. (4 pts)

(b) Use your formula to find how fast the orange was traveling after 24 feet. (4 pts)

(c) How far must the orange fall before it reaches a speed of 40 miles per hour (5280 feet in 1 mile)? (4 pts)
4. A certain radioactive substance decays 22% in 10 days. How long before 23 grams decays to 10 grams? (5 pts)

5. If $F'(t) = \ln(t^2 + 1)$ and $F(0) = 3$, find the value of $F(1)$. (4 pts)
6. Let \( F(b) = \int_0^b -e^{-x^2} \, dx \). (5 pts ea)
   
   (a) What is \( F(1) \)?
   
   (b) Does the value of \( F(b) \) increase or decrease as \( b \) increases?

7. A cup of coffee at 20° C is put into a microwave when \( t = 0 \). If the coffee’s temperature is changing at a rate given in °C per seconds by \( r(t) = 7e^{-0.1t} \) (with \( t \) in seconds),
   
   (a) What is the coffee’s temperature after 1 minute? (5 pts)
   
   (b) When is the coffee’s tempurature increasing the fastest? (5 pts)
8. Find the area between the two curves \( f(x) = 4x^3 - 4x \) and \( g(x) = x^2 \) on the interval \(-1 \leq x \leq 2\) (5 pts)

9. The graph of \( f(x) \) is shown. (5 pts ea)

(a) Find the area between the curve and the x-axis.

(b) Find \( \int_{0}^{10} f(x) \, dx \).
10. The function $G$ has exactly one critical point at $x = 1$. If $G'(2) = 1$ and $G'(-1) = 2$. Is the point $(1, G(1))$ a local max, local min, or neither? Explain. (5 pts)

11. The differential equation $y' + 3y = 2x$ has a general solution $y = \frac{2x}{3} - \frac{2}{9} + Ce^{-3x}$. (4 pts ea)

   (a) Show the general solution is a solution.

   (b) If $y(1) = 2$ then what is $C$?
12. Let \( f(x) = x^3 - 2x^2 - 4x - 12 \) (5 pts ea)

(a) Find the critical points.

(b) Find the inflection points.

(c) Find the global max and min on \(-1 \leq x \leq 2\)