1. Find the intervals on which the following functions are continuous:
   a. \( f(x) = \ln(2x + 5) \)
   b. \( f(x) = \begin{cases} 
   x^2 + 5, & x \leq -5 \\
   \frac{x-2}{x+4}, & -5 < x < 0 \\
   4x - \frac{1}{2}, & x \geq 0 
   \end{cases} \)

2. Find all asymptotes and discontinuities for the following functions:
   a. \( f(x) = \frac{x-1}{(x+3)^2} \)
   b. \( f(x) = \frac{x^2-x-6}{x^2+2x-15} \)
   c. \( f(x) = \frac{x^2-2x-3}{x^4-3x^3-4x^2} \)
   d. \( f(x) = \frac{5e^x+2e^{-x}}{e^{3x}-5} \)

3. Find the following limits:
   a. \( \lim_{x \to 3^-} \frac{x^2+x-6}{x-3} \)
   b. \( \lim_{x \to 1} \frac{x^2-3x-4}{x+1} \)
   c. \( \lim_{x \to \infty} \frac{4x^2-7x+2}{5x-3x^2} \)
   d. \( \lim_{x \to -\infty} \frac{-4x^3-7x^2}{2x^2+3} \)
   e. \( \lim_{x \to -\infty} \frac{3-e^x}{9-42e^{-x}} \)
   f. \( \lim_{x \to 1} \frac{\sqrt{x+3}-2}{x-1} \)
   g. \( \lim_{x \to \pm \infty} \frac{3e^{-x}-e^x}{9e^x-42e^{-x}} \)

4. A company spends $5300 to make 100 sweaters and $8200 to make 200 sweaters. Assuming a linear relation between cost and the number of sweaters produced, find a model that gives cost (in dollars) as a function of sweaters made. How much will it cost to make 500 sweaters? Interpret the slope and the y-intercept.

5. Describe how the function \( f(x) \) transforms to \( g(x) = -5f(x + 2) - 3 \)?

6. Find the domain of \( f(x) = \frac{4\sqrt{5-3x}}{x^2+6x+8} \)
7. Use the table below to find the following:

<table>
<thead>
<tr>
<th>x</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>f(x)</td>
<td>-6</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>g(x)</td>
<td>8</td>
<td>5</td>
<td>-3</td>
<td>1</td>
<td>-1</td>
<td>0</td>
</tr>
</tbody>
</table>

a. \((f \circ g)(4)\)
b. \((f \circ g)(3)\)
c. \((f \circ g)(2)\)

8. Simplify the following expressions:
   a. \(\log_9 9^{3x-1} + \log_2 16 - 4\log_4 x\)
   b. \(\frac{e^{3x-5x-1}}{e^{5x+1} + e^4} - \ln x + 2\ln(3x - 5)\)

9. Solve for \(x\):
   a. \(5 + 3^{x-2}9^{3x+4} = 11\)
   b. \(2\log_2 x - \log_2(x - 3) = \log_{10} 100\)
   c. \(e^{2x} + 5e^x = 150\)

10. Given \(f(x)\), find the inverse function \(f^{-1}(x)\). Give the domain and range of both.
    a. \(f(x) = \ln(3 + \ln(x))\)
    b. \(f(x) = 3e^{-4x} + 2\)
    c. \(f(x) = 2x^2 - 8\) on the restricted domain \([0, \infty)\)

11. Given that the half-life of a certain drug is 2 days when ingested, and that 16mg of the drug were taken orally, after how many days will there be 1 mg left in the body? How much of the drug can still be found in the body 5 days after ingestion?

12. The per capita consumption of potato chips in a town increased over 5 years as shown in the table below. Fit the data to a linear regression model using a calculator. If the trend continued, how many mg of chips was consumed in the year 2011? In which year would the consumption reach 4mg?

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>mg/person/year</td>
<td>2.1</td>
<td>2.4</td>
<td>2.6</td>
<td>2.9</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Note: With many thanks to Kendra Kilmer