3. [11 points] No work or explanation is required on this page.

a. [4 points] Determine which, if any, of the functions listed below satisfy all of the following:
   - It has a zero at $x = -5$.
   - Its long-run behavior satisfies $y \to -\infty$ as $x \to \infty$.
   - Its long-run behavior satisfies $y \to -\infty$ as $x \to -\infty$.

   (Circle all of the functions that satisfy all three conditions, if there are any; otherwise, circle None of these.)

   i. $y = -4(x - 5)(x - 1)^2(x + 2)$
   ii. $y = 2(x + 5)(x + 1)^2(x - 2)^2$
   iii. $y = -4(x + 5)(x + 1)^2(x - 2)$
   iv. $y = \frac{-4(x - 5)(x + 1)}{x + 5}$
   v. $y = \frac{-4(x + 5)(x + 1)^2(x - 5)}{x^2 + 25}$
   vi. $y = \frac{-2(x + 5)(x - 5)(x - 2)}{x^2 + 25}$
   vii. None of these

b. [3 points] Which, if any, of the following functions have $y = 2$ as a horizontal asymptote? Circle your answer(s).

   i. $y = \frac{6x^4 - 5x^2 + 3}{3x^4 + 2x - 1}$
   ii. $y = \frac{(2x - 1)(x + 3)(x - 5)}{(x + 1)(x - 4)}$
   iii. $y = \frac{2e^x + x^2}{2 + e^x}$
   iv. $y = \frac{2 \ln x + x}{\ln x + 3}$
   v. None of these

c. [4 points] Data for a function $g(s)$ is given in the following table.

<table>
<thead>
<tr>
<th>$s$</th>
<th>-4</th>
<th>-2</th>
<th>-1</th>
<th>1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$g(s)$</td>
<td>13</td>
<td>5</td>
<td>2</td>
<td>-2</td>
<td>-4</td>
</tr>
</tbody>
</table>

   For each property listed below, determine whether $g(s)$ could have that property on the entire domain $[-4, 3]$. (Circle each term that could describe $g(s)$, if there are any; otherwise, circle None of these.)

   i. Increasing
   ii. Decreasing
   iii. Concave up
   iv. Concave down
   v. An odd function
   vi. An even function
   vii. An invertible function
   viii. A linear function
   ix. An exponential function
   x. None of these