Calculus I, Math 2255

Pretest 1

1. Find a formula for the inverse of \( f(x) = e^x + 2 \).
   i) Graph both the function \( f \) and \( f^{-1} \).
   ii) What is \( f^{-1}(3) \)?
   iii) \( f \) is odd, even, or neither.

2. A function is given by a table of values.
   i) Is the function one-to-one?
   
<table>
<thead>
<tr>
<th>( x )</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>20</td>
<td>41</td>
<td>65</td>
<td>79</td>
<td>100</td>
</tr>
</tbody>
</table>
   
   i) Use regressions to find a model for the above function and approximate \( f(10) \).
   Linear Regression.
   
3. Find the domain of \( f(x) = \frac{x + 2}{\sqrt{x - 4}} \).
   What is the value of \( f(6) \)?
   What are(is) \( x \)-intercepts of \( f \)?

4. Let \( f(x) = x^2 + 2x \) and \( g(x) = \sqrt{x} + 3 \). Find each of the following functions and its domain.
   a) \( \frac{f}{g} \)
   b) \( g \circ f \)
   Domain of \( \frac{f}{g} \)
   Domain of \( g \circ f \)

5. Sketch the graph of \( y = 2 + \sin^2 x \).

6. The doubling time of certain bacteria is approximately 5 hours. Suppose that there are initially 80 bacteria
   i) What is the size population after \( t \) hours.
   ii) Estimate the size of population after 8 hours.
   iii) Estimate the time for the population to reach 140.

7. Find the exact value of each of the following.
   a) \( \ln(\ln e^4) \)
   b) \( \log_{\frac{1}{8}} \frac{1}{8} \)
   c) \( \ln e^{8x^2} \)
   d) \( 5^{\log_5 2x} \)

8. Solve the equation \( e^{5x + 8} = 40 \).

9. Express the function \( f(x) = \sin^3(\sqrt{x}) \) in the form \( g \circ h \).

10. Refer to the function \( y = f(x) \) to your right.
   i) Domain of \( f \)
   ii) Range of \( f \)
   iii) \( f(0) \)
   iv) For what value(s) of \( x \), \( f(x) = -3 \)
   v) On what interval(s) the function is increasing.
   vi) On what interval(s) the function is decreasing.