Sec 4.5 – Describing Characteristics of Exponential Functions

Name:

   A. Consider the following function.
   B. Consider the following function.

   ![Graph of y = 2^x - 4](image)

   i) Describe the **Domain**: ________________
   ii) Describe the **Range**: ________________
   iii) Describe **Intervals of Increase**: ________________
   iv) Describe **Intervals of Decrease**: ________________
   v) As \( x \to \infty \), determine \( f(x) \to \) ________________
   vi) As \( x \to -\infty \), determine \( f(x) \to \) ________________
   vii) Determine the **x-intercept**: ________________
   viii) Determine the **y-intercept**: ________________
   ix) **Horizontal Asymptote**: ________________

   ![Graph of y = (\frac{1}{3})^x - 3](image)

   i) Describe the **Domain**: ________________
   ii) Describe the **Range**: ________________
   iii) Describe **Intervals of Increase**: ________________
   iv) Describe **Intervals of Decrease**: ________________
   v) As \( x \to \infty \), determine \( f(x) \to \) ________________
   vi) As \( x \to -\infty \), determine \( f(x) \to \) ________________
   vii) Determine the **x-intercept**: ________________
   viii) Determine the **y-intercept**: ________________
   ix) **Horizontal Asymptote**: ________________

C. Consider the following function.

   ![Graph of y = -(2^x) + 2](image)

   i) Describe the **Domain**: ________________
   ii) Describe the **Range**: ________________
   iii) Describe **Intervals where the graph is Positive**: ________________
   iv) Describe **Intervals where the graph is Negative**: ________________
   v) As \( x \to \infty \), determine \( f(x) \to \) ________________
   vi) As \( x \to -\infty \), determine \( f(x) \to \) ________________
   vii) Determine the **x-intercept**: ________________
   viii) Determine the **y-intercept**: ________________
   ix) **Horizontal Asymptote**: ________________
   A. Consider the following function.
   B. Consider the following function.

   i) Describe the **Domain**: ________________

   ii) Describe the **Range**: ________________

   iii) Describe **Intervals of Increase**: ________________

   iv) Describe **Intervals of Decrease**: ________________

   v) As $x \to \infty$, determine $f(x) \to$ ________________

   vi) As $x \to -\infty$, determine $f(x) \to$ ________________

   vii) Determine the **x-intercepts**: ________________

   viii) Determine the **y-intercept**: ________________

   ix) **Interval where graph is Negative**: ________________

3. Create 3 different exponential functions of the form $f(x) = a^x + b$ that have a range of $y > 2$.

4. Find the average rate of change of the function $f(x) = 3^x - 2$ from $x = 1$ to $x = 2$.

5. Find the average rate of change of the function $f(x) = \left(\frac{1}{2}\right)^x + \frac{1}{2}$ from $x = 0$ to $x = 1$. 
6. Consider the function \( f(x) = 3^x \) and \( g(x) = 2^x \)

a. Find a range of x-values for which the average rate of change of \( f(x) = 3^x \) is greater than the average rate of change of \( g(x) = 2^x \)

b. Find a range of x-values for which the average rate of change of \( f(x) = 3^x \) is less than the average rate of change of \( g(x) = 2^x \)