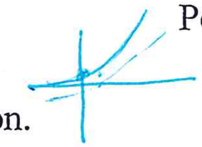
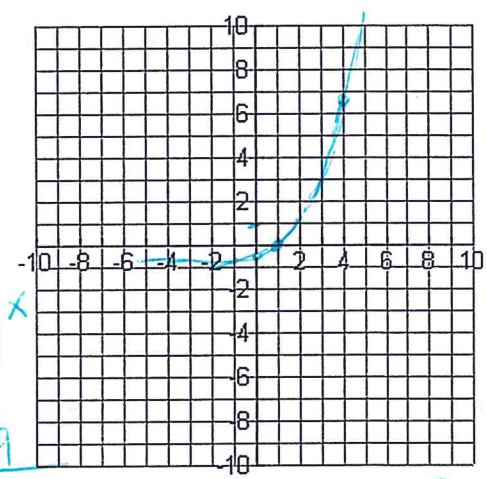
Section 3.1 Review #2 Precalculus with Trig Name________________

Period _____

1. $f(x) = 2^{x-1} - 1$ down one



   A) Find the domain using interval notation. $(-\infty, \infty)$
   B) Find the range using interval notation. $(-1, \infty)$
   C) Find the horizontal asymptote, if it exists. $y = -1$
   D) Find the vertical asymptote, if it exists. none
   E) Is it an increasing or a decreasing function? increasing
   F) Is the graph concave upward or concave downward? concave up
   G) Write the ordered pair for the point when x = 1. $2^{(1-1)} - 1$ $(1, 0)$
   H) Find the y-intercept . $2^{0-1} - 1 = \frac{1}{2} - 1 = -\frac{1}{2}$ $(0, -\frac{1}{2})$
   I) State the two transformations, in the correct order, that are needed to get this graph from the parent graph of $g(x) = 2^x$. right one unit down one unit
   J) This is a nonalgebraic function called a transcendental function.
   K) Sketch the graph of this equation using the information from A) through H) above.



   L) Name the two tests that this graph has to pass to be called a one-to-one function?
      horizontal line test / vertical line test
   M) Is it a one-to-one function? yes
   N) Write the definition of Euler's number.
      $e = \lim$ as $x \to \infty$ of $f(x) = \left(1 + \frac{1}{x}\right)^x$

2. Find the horizontal asymptotes for this function: $f(x) = \dfrac{9}{2 + e^{\frac{2}{x}}}$ when

   $\dfrac{9}{2+e^{\frac{2}{\infty}}}$ 9

   $2 + e^{\frac{2}{\infty}}$ $2 + e^{\frac{-2}{\infty}}$ $2 + e^0 = 3$ $9/3 = 3$

   $\dfrac{9}{2+e^{\frac{2}{\infty}}} = \dfrac{9}{2+e^0}$ $\dfrac{9}{3} = 3$

   A) $x \to -\infty$ ____3____ B) $x \to \infty$ ____3____

3. Write the equations to find the value of an investment in which you invested \$5000 that earned 2.5% interest over a period of 20 years if the compounding is

   A) daily. $A = 5000\left(1 + \frac{.025}{365}\right)^{365 \cdot 20}$ B) continuously. $A = 5000 \cdot e^{.025 \cdot 20}$

4. A radioactive isotope R has a mass in grams given by the equation: $R = 10\left(\frac{1}{2}\right)^{\frac{t}{2012}}$ where t is measured in years.
   A) Find the initial mass of the sample (when t = 0). 10 grams
   B) How many years would have to pass for it to reach half of the initial mass? 2012

   $.5 = .5^{\frac{x}{2012}}$ $\log_{.5} \frac{x}{2012} = .5$ $\log_{.5} .5 = \frac{x}{2012}$ $2012 \cdot \log_{.5} .5$

Section 3.1 – Extra Practice

Name: ______________________

Determine whether an exponential function is exponential growth, exponential decay, or neither without the help of a calculator:

1. $f(x)=\left(\frac{1}{6}\right)^{x}$

decay
$a<1$

2. $f(x)=\left(\frac{1}{5}\right)^{-x}$

growth
$=5^x$

3. $f(x)=7^{x}$

growth

4. $f(x)=8^{-x}$

decay $\left(\frac{1}{8}\right)^x$

5. $f(x)=x^{2}$

neither

6. $f(x)=2\cdot 7^{x}$

growth

7. $f(x)=\frac{1}{3}\cdot 8^{x}$

growth

8. $f(x)=x^{4}-8$

neither

Determine the horizontal asymptotes of the following equations without the assistance of a calculator:

$n^0 \Rightarrow 1$
$n^\infty \Rightarrow \infty$
$n^{-\infty} \Rightarrow 0$
$\frac{n^{-\infty}}{1} = \frac{1}{n^\infty} = \frac{1}{\infty} \Rightarrow 0$

9. $f(x)=\frac{7}{2+e^{x}}$

$x\to-\infty \quad y\to$ $7/2$

$x\to\infty \quad y\to$ 0

$\frac{7}{2+e^{-\infty}} = \frac{7}{2+\frac{1}{e^\infty}}$

$\frac{7}{2+e^\infty} = \frac{7}{2+\infty} = \frac{7}{\infty} = 0$

10. $f(x)=\frac{-5}{1+e^{\frac{2}{x}}}$

$x\to-\infty \quad y\to$ $-\frac{5}{2}$

$x\to\infty \quad y\to$ $-\frac{5}{2}$

$\frac{-5}{1+e^{\frac{2}{-\infty}}}$ $\quad \frac{-5}{1+e^{\frac{2}{\infty}}}$ $\quad \frac{-5}{1+e^0}$ $\quad -\frac{5}{2}$

$1+e^0=2$

11. $f(x)=\frac{6}{-3+e^{-5x}}$

$x\to-\infty \quad y\to$ 0

$x\to\infty \quad y\to$ -2

$\frac{6}{-3+e^{-5\cdot-\infty}} = \frac{6}{-3+e^{5\infty}} = \frac{6}{\infty} = 0$

$\frac{6}{-3+e^{-5\infty}}$ $\quad \frac{6}{-3+0} = -2$

12. $f(x)=\frac{4}{3+e^{\frac{-4}{x}}}$

$x\to-\infty \quad y\to$ 1

$x\to\infty \quad y\to$ 1 OK

$\frac{4}{3+e^{\frac{-4}{-\infty}}} = \frac{4}{3+e^0} = \frac{4}{4} = 1$

$\frac{4}{3+e^{\frac{-4}{\infty}}} = \frac{4}{3+e^{\frac{4}{\infty}}} = \frac{4}{4} = 1$