

Honors Algebra II
Exponential Growth & Decay WS #1

Name AK

I. Identify if the following are exponential growth or exponential decay.
Rewrite the function if possible.

1. $f(x) = \left(\frac{1}{5}\right)10^{x+3} - 1$

growth
no rewrite possible

2. $f(x) = 36\left(\frac{1}{6}\right)^{x-3} + 7$

decay
 $6^2\left(\frac{1}{6}\right)^{x-3} + 7 = \left(\frac{1}{6}\right)^{x-5} + 7$

3. $y = 8 \cdot 4^{-(x-1)} + 3$ decay

$2^3\left(\frac{1}{2}\right)^{2x-2} + 3$
 $\left(\frac{1}{2}\right)^{-3}\left(\frac{1}{2}\right)^{2x-2} + 3$
 $y = \left(\frac{1}{2}\right)^{2x-5} + 3$

4. $y = \frac{1}{9}\left(\frac{1}{3}\right)^{x+3}$ decay

$y = \left(\frac{1}{3}\right)^2\left(\frac{1}{3}\right)^{x+3} = \left(\frac{1}{3}\right)^{x+5}$

5. $f(x) = -8 \cdot \left(\frac{1}{2}\right)^{2x-4} = -8(2)^{2x-4}$ growth

$f(x) = -(2^3)(2)^{2x-4} = -(2)^{2x-1}$

6. $f(x) = \frac{1}{125} \cdot 5^{x+6} - 4$ growth

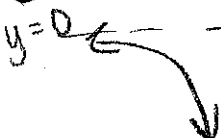
$5^{-3} \cdot 5^{x+6} - 4$
 $f(x) = 5^{x+3} - 4$

II. Determine the type of function again. Also identify the characteristics for the functions.

5. $f(x) = -\frac{1}{3} \cdot \left(\frac{5}{2}\right)^x$

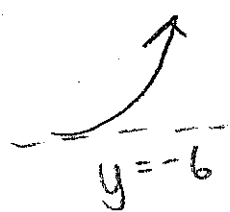
Parent: $y = \frac{5}{2}^x$ type: growth

D: $(-\infty, \infty)$ R: $(-\infty, 0)$
Asymptote: $y = 0$ Y-Int: $(0, -\frac{1}{3})$
Int of de crease: $(-\infty, \infty)$
End Behavior: As $x \rightarrow -\infty$, $y \rightarrow 0$; As $x \rightarrow \infty$, $y \rightarrow -\infty$



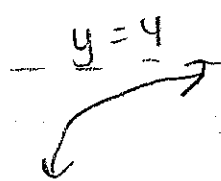
6. $f(x) = 5 \cdot (3)^{x-4} - 6$ Parent: $y = 3^x$ type: growth

D: $(-\infty, \infty)$ R: $(-6, \infty)$
Asymptote: $y = -6$ Y-Int: $(0, -481/81)$
Int of in crease: $(-\infty, \infty)$
End Behavior: As $x \rightarrow -\infty$, $y \rightarrow -6$; As $x \rightarrow \infty$, $y \rightarrow \infty$



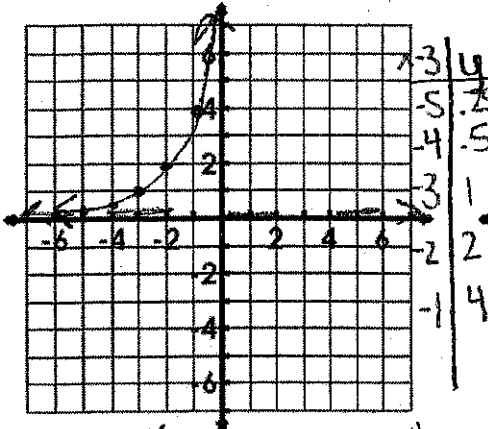
7. $y = -3(0.5)^{x+3} + 4$ Parent: $y = 5^x$ type: decay

D: $(-\infty, \infty)$ R: $(-\infty, 4)$
Asymptote: $y = 4$ Y-Int: $(0, 29/8)$ or $(0, 3.625)$
Int of in crease: $(-\infty, \infty)$
End Behavior: As $x \rightarrow -\infty$, $y \rightarrow -\infty$; As $x \rightarrow \infty$, $y \rightarrow 4$



Graphing Exponential Functions

1. $f(x) = 2^{x+3}$
 x: shift left 3

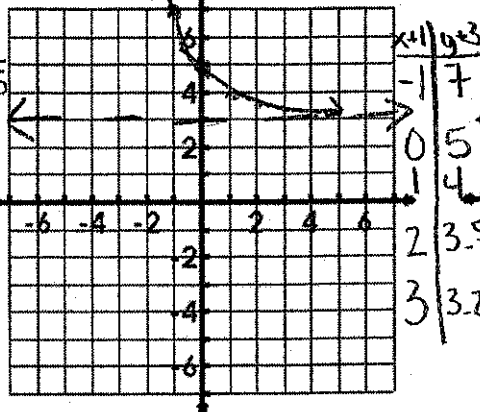


Parent: 2^x Type: growth

D: $(-\infty, \infty)$ R: $(0, \infty)$

Asymptote: $y = 0$

2. $f(x) = (\frac{1}{2})^{x-1} + 3$
 x: shift right 1
 y: shift up 3

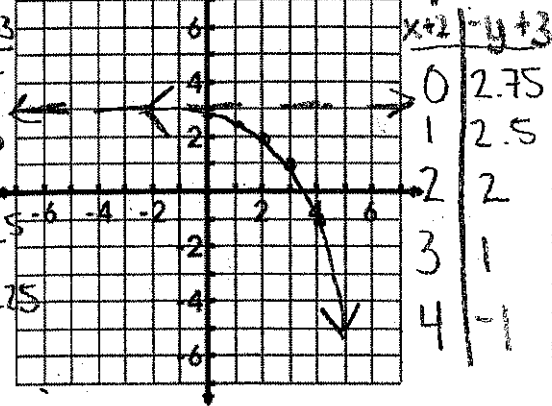


Parent: $\frac{1}{2}^x$ Type: decay

D: $(-\infty, \infty)$ R: $(3, \infty)$

Asymptote: $y = 3$

3. $f(x) = -2^{x-2} + 3$
 x: shift right 2
 y: reflect over x-axis, shift up 3



Parent: 2^x Type: growth

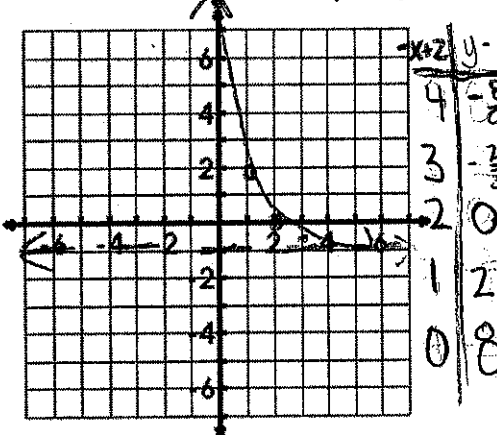
D: $(-\infty, \infty)$ R: $(-\infty, 3)$

Asymptote: $y = 3$

4. $f(x) = 3^{2-x} - 1$
 x: reflect over y-axis, shift right 2
 y: shift down 1
 $= 3^{-(x-2)} - 1 = \frac{1}{3}^{x-2} - 1$

5. $f(x) = -3(\frac{1}{3})^{x+1} + 2$
 x: shift left 1
 y: reflect over x-axis, v. stretch by 3, shift 6 up 2

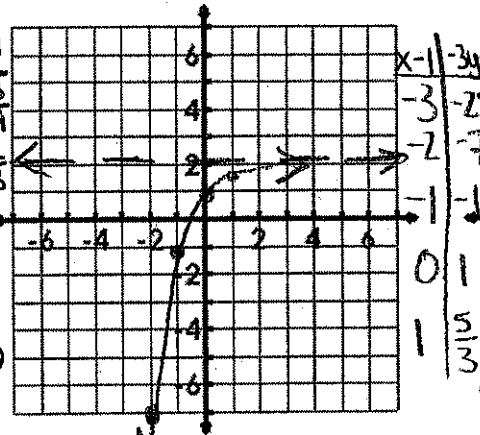
6. $f(x) = 2(3)^x - 6$
 x: none
 y: v. stretch by 2, shift down 6



Parent: 3^x Type: decay

D: $(-\infty, \infty)$ R: $(-1, \infty)$

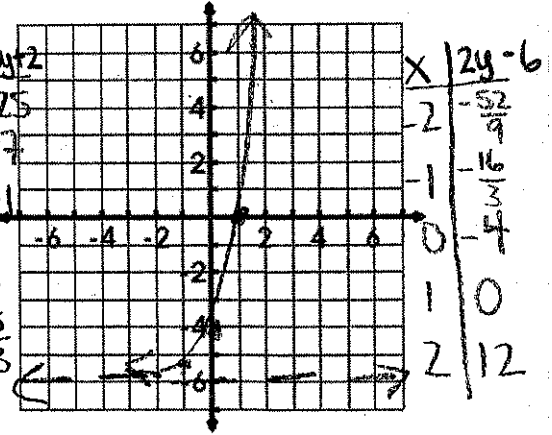
Asymptote: $y = -1$



Parent: $\frac{1}{3}^x$ Type: decay

D: $(-\infty, \infty)$ R: $(-\infty, 2)$

Asymptote: $y = 2$



Parent: 3^x Type: growth

D: $(-\infty, \infty)$ R: $(-6, \infty)$

Asymptote: $y = -6$