7.2 Properties of Exponential Models

Transformations
Of Exponential Functions

$f(x) = a \cdot b^{x-h} + k$

table 1 → only a
table 2 → add h, k

- h is the horizontal shift (+ shifts left, - shifts right)
- k is the vertical shift (+ shifts up, - shifts down)
- If a is negative, the function is reflected across the x-axis
- $|a| > 1$ represents a vertical stretch
- $0 < |a| < 1$ represents a vertical compress

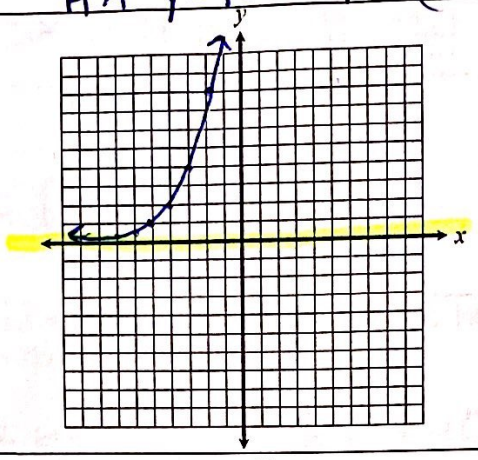
HA $y = k$ R: (k, ∞) or $(-\infty, k)$

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

x	2^x
-2	.25
-1	.5
0	1
1	2
2	4

x	y
-7	.25
-6	.5
-5	1
-4	2
-3	4

left 5



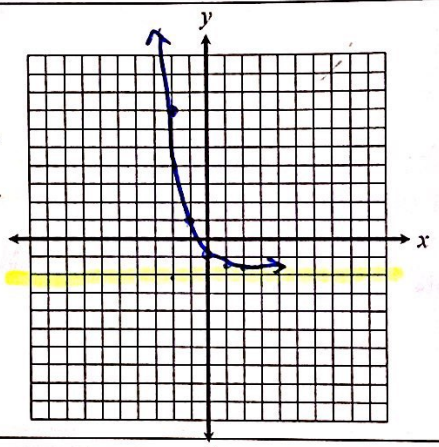
Domain: R
Range: $(0, \infty)$
y-intercept: $(0, 32)$
Asymptote: $y = 0$
Growth/Decay

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

x	$(\frac{1}{3})^x$
-2	9
-1	3
0	1
1	.3̄
2	.1

x	y
-2	7
-1	1
0	-1
1	-1.6
2	-1.9

down 3



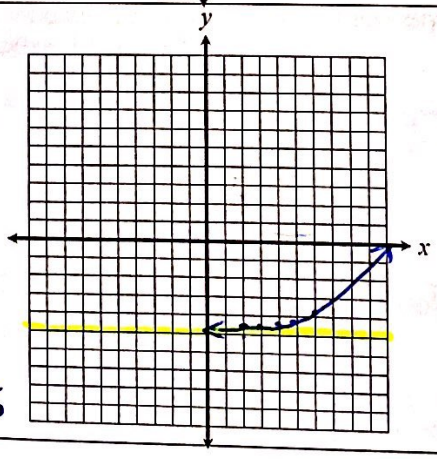
Domain: R
Range: $(0, \infty)$
y-intercept: $(0, -1)$
Asymptote: $y = 0$
Growth/Decay

3. $f(x) = \frac{1}{2}\left(\frac{3}{2}\right)^{x-4} - 5$

x	$\frac{1}{2}(\frac{3}{2})^x$
-2	.8̄
-1	.3̄
0	.5
1	.75
2	1.125

x	y
2	-4.8̄
3	-4.7
4	-4.5
5	-4.25
6	-3.875

right 4
down 5



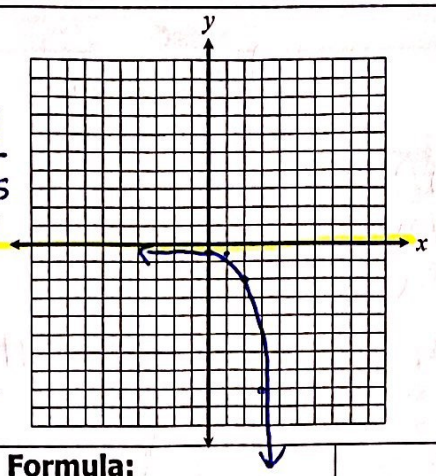
Domain: R
Range: $(-5, \infty)$
y-intercept: $(0, -4.9)$
Asymptote: $y = -5$
Growth/Decay

4. $f(x) = -2 \cdot 4^{x-2}$

X	$-2 \cdot 4^X$
-2	-0.125
-1	-.5
0	-2
1	-8
2	-32

right 2 →

X	Y
0	-.125
1	-.5
2	-2
3	-8
4	-32



Domain: $\mathbb{R}$

Range: $(0, \infty)$

y-intercept: $(0, -.125)$

Asymptote: $y = 0$

Growth / Decay

Continuously Compounded Interest	**Formula:**	$P =$ principle (initial) $r =$ rate (dec) $t =$ time
	$A = Pe^{rt}$	

5. Laura deposited $12,000 into an account that earns 8% interest. How much money will she have in 5 years if the interest is compunded continuously?

$A = 12000 \cdot e^{.08(5)} = \$17901.90$

6. Jack took out a 6-year loan for $25,000 to purchase a boat at a 4.5% interest rate. If the interest is compunded continuously, what will he have paid total over the course of the loan?

$A = 25000 \cdot e^{(.045)(6)} = \$32749.11$

7. An investment account pays 3.9% interest compounded continuously. If $4,000 is invested in this account, what will be the balance after 12 years?

$A = 4000\, e^{.039(12)} = \$6387.19$

8. A savings account offer 0.8% interest compunded continuosly. If Bob deposited $300 into this account, how much interest will he earn after 10 years?

$A = 300\, e^{.008(10)} = \$324.99$