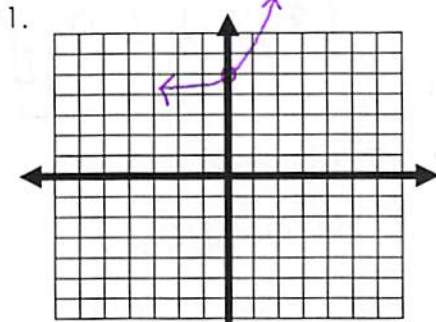


Coordinate Algebra
Review Worksheet for Unit 3 Test #2

Name _____ Class Period _____

For each of the functions find the following information.



Domain: $(-\infty, \infty)$

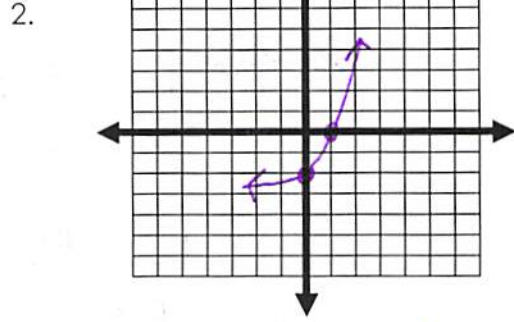
Range: $(4, \infty)$

x - intercept: none

y - intercept: $(0, 5)$

Increasing or Decreasing

End Behavior: As $x \rightarrow \infty, y \rightarrow \infty$
As $x \rightarrow -\infty, y \rightarrow 4$



Domain: $(-\infty, \infty)$

Range: $(-3, \infty)$

x - intercept: $(1, 0)$

y - intercept: $(0, -2)$

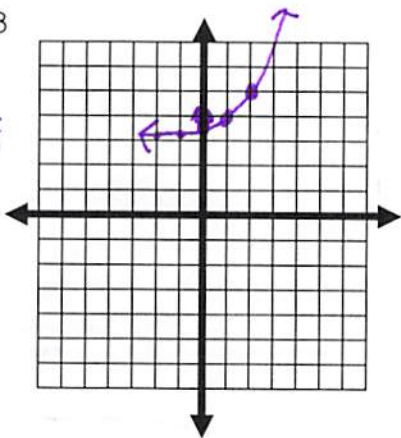
Increasing or Decreasing

End Behavior: As $x \rightarrow \infty, y \rightarrow \infty$
As $x \rightarrow -\infty, y \rightarrow -3$

Make a table of values to graph the following functions.

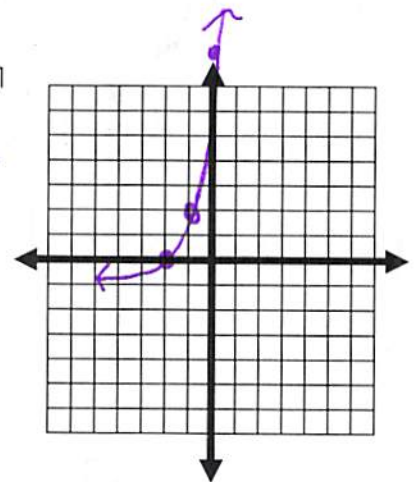
3. $f(x) = 2^{x-1} + 3$

x	y
-2	3.125
-1	3.25
0	3.5
1	4
2	5



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

x	y
-2	0
-1	2
0	8
1	26
2	80

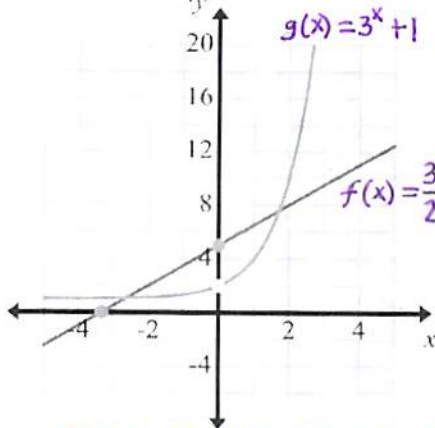


5. Find the rate of change over the interval $[1, 3]$ for $f(x) = 2^x + 1$.

$f(1) = 2^1 + 1$ $f(3) = 2^3 + 1$
 $f(1) = 3$ $f(3) = 9$

$(1, 3)$
 $(3, 9)$
 $\frac{9-3}{3-1} = \frac{6}{2} = \boxed{3}$

6. Find the rate of change over $[0,2]$ and the y-intercepts for the two functions. Discuss and compare the functions by analyzing the rates of change, and intercepts.



$f(x)$ $g(x)$
ROC: $(0, 5)$ $\frac{8-5}{2-0} = \frac{3}{2}$ ROC: $(0, 2)$ $\frac{10-2}{2-0} = \frac{8}{2} = 4$
 $(2, 8)$ $f(0) = \frac{3}{2}(0) + 5$ $g(0) = 3^0 + 1$
 $f(2) = \frac{3}{2}(2) + 5$ $g(2) = 3^2 + 1$
y-intercept: $(0, 4)$ y-intercept: $(0, 1)$

The Rate of change for $g(x)$ is greater than the ROC for $f(x)$.

7. You have 2 basketballs that are losing air at two different rates. They both start out with the same amount of air, 800 cubic inches, and are losing air at different rates. The function $f(x) = 800(0.95)^x$ represents the air in ball A. The function $g(x) = 800(0.91)^x$ represents the air in ball B.

$f(x)$ has a greater y-intercept.

- a. Find the rate of change for each function over the interval $[2,4]$.

$f(x)$: $(2, 722)$ $(4, 651.61)$ $g(x)$: $(2, 662.48)$ $(4, 548.60)$
 $f(2) = 800(0.95)^2$ $\frac{651.61 - 722}{4 - 2} = -35.20$ $g(2) = 800(0.91)^2$ $\frac{548.60 - 662.48}{4 - 2} = -56.94$
 $f(4) = 800(0.95)^4$ $g(4) = 800(0.91)^4$

- b. Which medicine ball has a faster rate of change and will deflate first?

$g(x)$ has a larger ROC & will deflate first.

8. Find the rate of change for the function below over the interval $[0,3]$.

X	B(x)
0	65
1	83
2	101
3	119

$(0, 65)$ $(3, 119)$

$\frac{119 - 65}{3 - 0} = 18$

Given the functions: $f(x) = -3x^2 + 2x - 6$ and $g(x) = 4x^2 + x - 8$ $h(x) = 3x^3$

9. Find $g(-3)$ $\frac{25}{}$
 $g(-3) = 4(-3)^2 + (-3) - 8$

10. Find $h(x) \cdot f(x)$ $\frac{-9x^5 + 6x^4 - 18x^3}{3x^3(-3x^2 + 2x - 6)}$

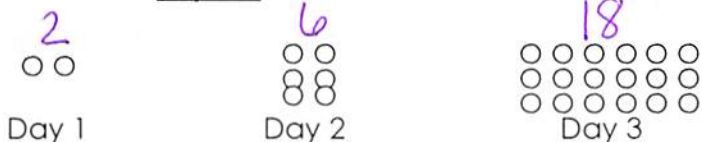
11. Find $f(x) - g(x)$ $\frac{-7x^2 + x + 2}{-3x^2 + 2x - 6 - (4x^2 + x - 8)}$
 $-3x^2 + 2x - 6 - 4x^2 - x + 8$

12. Find $2f(x) + 4g(x)$ $\frac{10x^2 + 8x - 44}{2(-3x^2 + 2x - 6) + 4(4x^2 + x - 8)}$
 $-6x^2 + 4x - 12 + 16x^2 + 4x - 32$

Arithmetic: $a_n = a_1 + (n-1)d$ or $a_n = dn + a_0$

Geometric: $a_n = a_1(r)^{n-1}$

13. Write an **explicit** formula to model the number of dots per day.



$$a_n = 2(3)^{n-1}$$

14. Sherry has a huge doll collection of 80 dolls. Her mom tells her that she needs to get rid of 5 per year to get it down to a decent number before leaving for college. Write an **explicit** formula to model the number of dolls per day. If she is 12, how many will she have left when she is 18?

$$a_n = -5n + 80$$

$$18 - 12 = 6 \text{ years}$$

$$a_6 = -5(6) + 80$$

$$a_6 = 50 \text{ dolls}$$

15. Write a story for this **linear** function: $f(x) = 30x + 45$

Jessica has read 45 pages of her book. Each day she decides to read 30 pages of her book.

16. Write a story for this **exponential** function: $f(x) = 4(3)^x$

A clan of bunnies started with 4 bunnies. Every month the amount of bunnies triples.

17. The population of a large city increases by a rate of 3% a year. When the 2000 census was taken, the population was 1.2 million.

a) Write a model for this population growth.

$$y = 1.2(1 + .03)^t$$

$$y = 1.2(1.03)^t$$

b) What should the population be now? What is the projected population for 2020?

$$y = 1.2(1.03)^{13}$$

$$y = 1.76 \text{ million}$$

$$y = 1.2(1.03)^{20}$$

$$y = 2.17 \text{ million}$$

18. You bought a Boston Whaler in 2004 for \$12,500. The boat's value depreciates by 7% a year. How much is the boat worth now? How much is it worth in 2020?

$$y = 12,500(1 - .07)^x$$

$$y = 12,500(.93)^x$$

$$y = 12,500(.93)^9$$

$$y = \$6505.14$$

$$y = 12,500(.93)^{16}$$

$$y = \$3914.15$$

19. The foundation of your house has about 1,200 termites. The termites grow at a rate of about 2.4% per day. How long till the termites double?

$$y = 1,200(1.024)^x$$

$$2400 = 1,200(1.024)^x$$

$$x = 30 \text{ days}$$

20. You buy a new computer for \$2100. The computer decreases by 50% annually. When will the computer have a value of \$600?

$$y = 2100(.50)^x$$

$$600 = 2100(.50)^x$$

$$x = 2 \text{ years}$$

21. **Bank Plans:** Suppose you worked mowing lawns all summer and earned \$100. Two savings institutions want you to let them "hold onto your money" for a while.
Linear Luck: This savings plan will add \$100 to your balance for every month that you leave your money in the account.

$$y = 100x + 100$$

- Exponential Experiment:** This savings plan will multiply your balance by 2 every month that you leave your money in their account.

$$y = 100(2)^x$$

- Analyze the plans:** Write the **explicit** function for each account, and decide which account is best after one year.

$$\text{LL: } y = 100(12) + 100$$

$$y = \$1300$$

$$\text{EE: } y = 100(2)^{12}$$

$$y = \$409,600$$

Exponential Experiment is the best.

22. Describe the transformations made to $f(x) = 3^x$ without graphing the functions.

a) $g(x) = \frac{1}{4}3^{x-2} + 5$

- shrink
- right 2
- up 5

b) $h(x) = -2(3)^{x+1}$

- reflect
- stretch
- left 1

c) $f(x) = -6(3)^{x+3} - 2$

- reflect
- stretch
- left 3
- down 2

d) $f(x) = 3^{x-5} - 7$

- right 5
- down 7

23. Give the **domain**, **range**, and **asymptote** for $g(x) = \frac{1}{4}3^{x-2} + 5$.

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

$$R: (5, \infty)$$

$$A: y = 5$$

24. Write a function given the information below:

a. Parent function: $f(x) = 3^x$

- Stretches by 5
- Reflects
- Moves right 4

~~$f(x) = 5(3)^{x-4}$~~

$$f(x) = -5(3)^{x-4}$$

b. Parent function: $f(x) = 2^x$

- Moves up 1
- Moves left 6
- Shrinks by $\frac{2}{3}$

$$f(x) = \frac{2}{3}(2)^{x+6} + 1$$

25. You deposit \$3000 in an account that pays 3.25% annual interest. Find the balance after 7 years if the interest is compounded quarterly.

$$A = 3000 \left(1 + \frac{0.0325}{4}\right)^{4(7)}$$

$$A = \$3762.91$$

26. Sam invests in a mutual fund which is compounded semiannually for 10 years at a rate of 3.1%. When it matures, the investment will be worth \$2117.56. What was the initial investment he made?

$$2117.56 = P \left(1 + \frac{0.031}{2}\right)^{2(10)}$$

$$A = \$1556.82$$