Bellwork:

Donna throws a ball off a cliff. The equation that models the height of the ball at any given time is given by $h(t)=-16(t-.5)^2+120$.

What is the ball's height after 2 seconds?

$h(t) = -16(2-.5)^2+120 = 84\text{ ft}$

$=24$

Homework 2.5 Solutions

1.

A. $C(n)=0.79n+10$, $n\le 500$

B. 113 golf balls

2. $A(h)=h^2$

3.

A. ≈314.2 million people

B. ≈314.1 million people, the actual population was about 100,000 less than the model predicted. (source: US Census Bureau)

C. 2015: ≈322.8 million people
2016: ≈325.7 million people
2017: ≈328.6 million people
2018: ≈331.6 million people
2019: ≈334.6 million people
2020: ≈337.6 million people

4.

A. Vertex: $(0.25,501)$; the highest point of J.B.'s leap happened 0.25 seconds after he leaped and his height at that moment was 501 feet above the ground (1 foot above the top of the building.)

B. $h(3)=380$ ft above the ground; J.B. was 120 ft below the explosion.

5. Equivalent Forms: **B.** $4\left(\frac{1}{5}\right)^{-3x}$, **E.** $4(125)^x$

6. Equivalent Forms: **A.** $\frac{x+4}{3}$, **D.** $\frac{x}{3}+\frac{4}{3}$, **E.** $\frac{20x+80}{60}$

★7. $V(w)=(w+10)(w)(3w)=3w^3+30w^2$

4a) $h(t) = -16(t - .25)^2 + 501$

a) Find vertex & interpret

$(t, h(t))$ $(.25, 501)$

After .25 sec J.B. is at his max height of 501 ft.

Unit 2 Test Review Objectives

Review for Unit 2 Test!

1. Identify each of the four functions represented in the table as linear, absolute value, quadratic, or exponential.

x	$a(x)$	$b(x)$	$c(x)$	$d(x)$
-3	-2.5	0.01	8	25
-2	-3	0.1	-2	17
-1	-3.5	1	-8	9
0	-4	10	-10	1
1	-3.5	100	-8	-7
2	-3	1000	-2	-15
3	-2.5	10000	8	-23

a(x) = absolute value

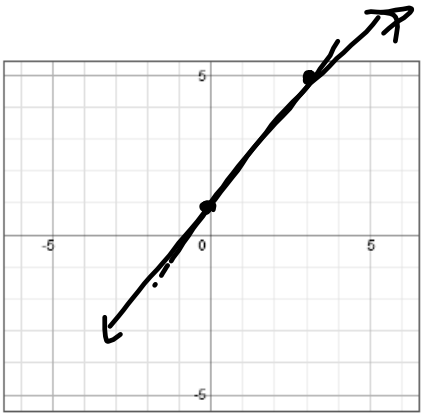
b(x) = exponential

c(x) = quadratic

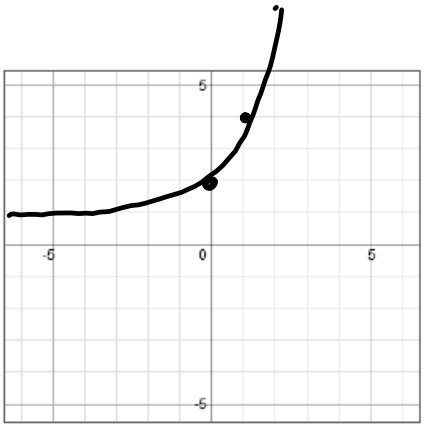
d(x) = linear

2. Graph the function: $f(x)=\frac{4}{3}x+1$

$y = mx + b$



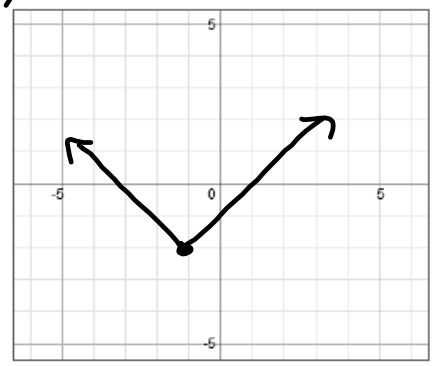
3. Graph the function: $f(x)=3^x+1$



math → NUM 1) abs

4. Graph the function: $f(x)=|x+1|-2$

(-1,-2)

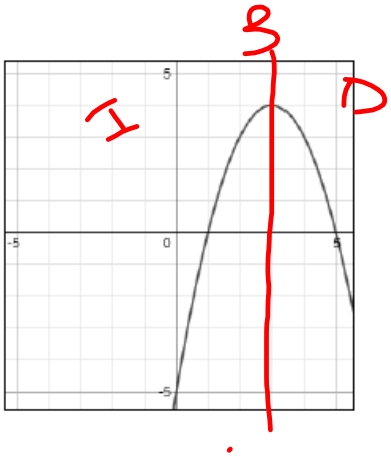


5. Given $f(x) = x^2$, explain the transformation given by $-f(x+5)-13$.

1. shift left 5 2. shift down 13

3. up-down flip (reflect over x-axis)

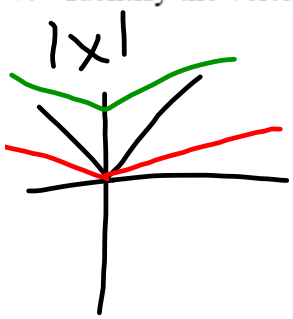
6. Use the graph of the function to identify intervals of increasing or decreasing.



I: $(-\infty, 3)$ $-\infty$ ∞

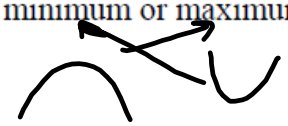
D: $(3, \infty)$

7. Identify the vertex of $f(x)=\frac{1}{2}|x|+8$ and whether it represents a minimum or maximum.



up 8

(0, 8) min



x=0

8. Identify the vertex and y-intercept of the graph of the function $y=-4(x-1)^2+6$.

$-4(0-1)^2+6$

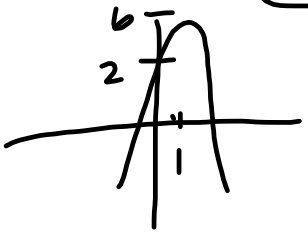
$-4(1)+6=2$

flip

keep

V: (1, 6)

y-int: (0, 2)



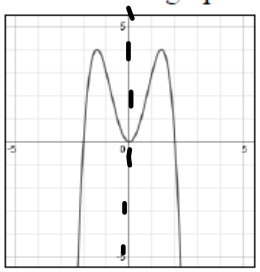
9. Label each function as odd, even, or neither.

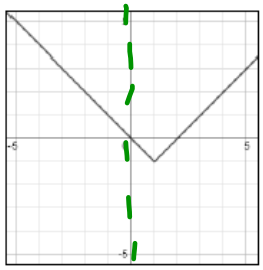
A. $f(x)=x^2+7$ e e x^0 even

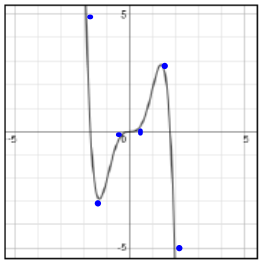
B. $f(x)=5x^3+3$ o e neither

C. $f(x)=4x^1$ odd

10. Label each function's graph as odd, even, or neither.

A.  even

B.  neither

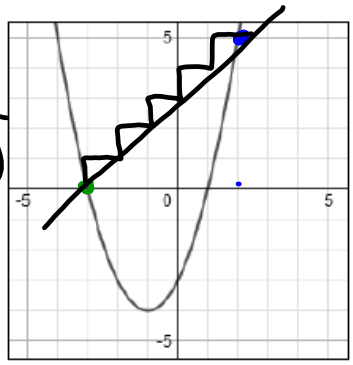
C.  odd

11. Use the graph to estimate the average rate of change of the function on the interval [–3, 2].

x_1 x_2

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 0}{2 - (-3)}$$

$$= \frac{5}{5} = 1$$



Use the following information for problems 12 and 13: The height of a softball thrown into the air with an initial velocity of 72 ft./sec. can be modeled by the equation $h(t) = -16t^2 + 72t + 7$. In this model, t represents time in seconds, and $h(t)$ represents the height of the ball in feet.

24

12. Find the average rate of change of $h(t)$ on the interval [1, 2].

x_1 x_2

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{87 - 63}{2 - 1} = \frac{24}{1}$$

$h(2) = -16(2)^2 + 72(2) + 7$

$h(1) = -16(1)^2 + 72(1) + 7$

13. What is the meaning of the rate of change found in problem 12?

Between 1 & 2 sec, the ball rose 24 ft/sec on average

14. The function $P(t)=300(1+0.06)^t$ is used to predict the current balance in Alex's bank account, where $P(t)$ is the current balance t years since 2010. (i.e. $t=0$ is 2010, $t=1$ is 2011, etc.). Predict his account balance in 2020.

$P(t) = 300(1+.06)^{10}$

$\$537.25$

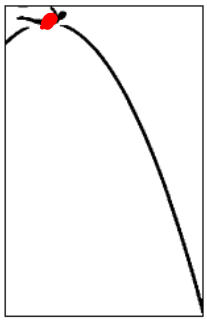
2020
- 2010
10

Use the following information for problems 15 and 16: Geraldo goes every year to a cliff diving competition in Acapulco. The competitors dive off of cliffs of varying heights into the ocean. His height above the ocean as a function of time can be modeled by the function $h(t)=-16(t-1)^2+135$, where t is time in seconds and $h(t)$ is height above the ocean in feet.

(t,h) (1,135)

15. How long did it take for Geraldo to reach his maximum height above the ocean? (2-5)

1 sec



16. At that time, how far above the ocean did he find himself? (2-5)

135ft