

February 11, 2019, Monday

List 5 characteristics of the following graph.

1) $8x + 5y = 20$

x -intercept: 2.5 or (2.5, 0)
 y -intercept: 4 or (0, 4)
 rate of change (slope) = -
 Slope, $m = -\frac{3}{2}$
 point (3, -1)

(hint: x -intercept, y -intercept, end behavior, rate of change (slope)...)

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Algebra 1 - U2B Day 2, 2/9/2018

Characteristics of Linear Functions Notes

Words to know:

- Domain: the values where the graph exists for x
- Range: the values where the graph exists for y
- Interval of Increase (+ slope) & Decrease (- slope): is the slope of y
- End Behavior: what the y value approaches as $x \rightarrow \infty$, then as $x \rightarrow -\infty$
- x -intercept(s): where the graph crosses the x -axis
- y -intercept: where the graph crosses the y -axis

Examples:

Example 1: Domain: \mathbb{R} (All real numbers), Range: \mathbb{R} , Interval: increases $(-\infty, \infty)$, End Behavior: As $x \rightarrow -\infty, f(x) \rightarrow -\infty$; As $x \rightarrow \infty, f(x) \rightarrow \infty$, x -intercept: 4 or (4, 0), y -intercept: -3 or (0, -3)

Example 2: Domain: \mathbb{R} , Range: \mathbb{R} , Interval: decreasing $(-\infty, \infty)$, End Behavior: As $x \rightarrow -\infty, f(x) \rightarrow \infty$; As $x \rightarrow \infty, f(x) \rightarrow -\infty$, x -intercept: 4 or (4, 0), y -intercept: 3 or (0, 3)

Example 3: Domain: \mathbb{R} , Range: \mathbb{R} , Interval: increasing $(-\infty, \infty)$, End Behavior: As $x \rightarrow -\infty, f(x) \rightarrow -\infty$; As $x \rightarrow \infty, f(x) \rightarrow \infty$, x -intercept: (-3, 0), y -intercept: (0, 4)

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Average Rate of Change (AROC) Notes

Today's Question: How do we find the rate of change of a function? (MSMA1A)

Rate of Change, ROC, = slope, m

- The rate of change is the ratio of the change of one quantity to a change in another quantity.
- Positive - $m = 3$ $m = \frac{3}{1}$
- Negative - $m = -4$ $m = -\frac{4}{1}$
- Which function has a constant rate of change? A line!
- Horizontal Lines - \downarrow 0 is the roc, $m = 0$
- Vertical Lines - \downarrow Undefined is the roc, $m = \text{und}$

Constant Rate of Change

The slope of a non-vertical line is the ratio of the vertical (change y) to the horizontal (change x) between any two points on the line.

Example 1: Find the slope between (2, 4) and (4, 6)

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 4}{4 - 2} = \frac{2}{2} = 1$

Example 2: The table shows the amount of water evaporating from a swimming pool on a hot day. Find the rate of change between 10:00 and 12:00 (Caters evaporator)

$m = \frac{13.5 - 4.5}{6 - 2} = \frac{9}{4} = 2.25$

Example 3: Find all rates of change between the points, then determine which has the greatest rate of change?

$x = -4 \rightarrow y = 4$ $m = \frac{5 - 0}{-4 - 3} = \frac{5}{-7} = -\frac{5}{7}$
 $x = 3 \rightarrow y = 6$ $m = \frac{7 - 0}{6 - 3} = \frac{7}{3} = 2.\overline{3}$
 $x = 6 \rightarrow y = 8$ $m = \frac{7 - 0}{6 - 8} = -\frac{7}{2} = -3.5$

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Algebra 1 - Day 2, 2/9/2018

Characteristics of Linear Functions HW

Example 1: Domain: \mathbb{R} , Range: \mathbb{R} , Interval: increases, End Behavior: As $x \rightarrow -\infty, f(x) \rightarrow -\infty$; As $x \rightarrow \infty, f(x) \rightarrow \infty$, x -intercept: -1 (1, 0), y -intercept: 1 (0, 1)

Example 2: Domain: \mathbb{R} , Range: \mathbb{R} , Interval: decreasing, End Behavior: As $x \rightarrow -\infty, f(x) \rightarrow \infty$; As $x \rightarrow \infty, f(x) \rightarrow -\infty$, x -intercept: 3 (3, 0), y -intercept: 4 (0, 4)

Example 3: Domain: \mathbb{R} , Range: \mathbb{R} , Interval: increasing, End Behavior: As $x \rightarrow -\infty, f(x) \rightarrow -\infty$; As $x \rightarrow \infty, f(x) \rightarrow \infty$, x -intercept: (0, 0), y -intercept: (0, 1)

Example 4: Domain: \mathbb{R} , Range: \mathbb{R} , Interval: decreases, End Behavior: As $x \rightarrow -\infty, f(x) \rightarrow \infty$; As $x \rightarrow \infty, f(x) \rightarrow -\infty$, x -intercept: (-3, 0), y -intercept: (0, -2)

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Average Rate of Change HW

Directions: Identify the average rate of change for the given intervals.

1) Using the given graph, identify the average rate of change over the given intervals.

a) $x = -2$ to $x = -1$: $m = \frac{1 - 0.5}{-1 - (-2)} = \frac{0.5}{1} = 0.5$
 b) $x = -1$ to $x = 0$: $m = \frac{2 - 1}{0 - (-1)} = \frac{1}{1} = 1$
 c) $x = 0$ to $x = 1$: $m = \frac{4 - 2}{1 - 0} = \frac{2}{1} = 2$
 d) $x = -2$ to $x = -1$: $m = \frac{4 - 0.5}{-1 - (-2)} = \frac{3.5}{1} = 3.5$

2) Using the given table, identify the average rate of change over the given intervals.

x_1	1	2	3	4
y_1	1	3	6	10
x_2	2	3	4	5
y_2	3	6	10	15

a) $x = 1$ to $x = 2$: $m = \frac{3 - 1}{2 - 1} = \frac{2}{1} = 2$
 b) $x = 2$ to $x = 3$: $m = \frac{6 - 3}{3 - 2} = \frac{3}{1} = 3$
 c) $x = 3$ to $x = 4$: $m = \frac{10 - 6}{4 - 3} = \frac{4}{1} = 4$
 d) $x = 1$ to $x = 4$: $m = \frac{10 - 1}{4 - 1} = \frac{9}{3} = 3$

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February 12, 2019 Tuesday

Give an equation $y = -9x + 4$ identify the x & y intercepts, state the domain and range

x -intercept: 0.5
 y -intercept: 4
 domain: \mathbb{R}
 range: \mathbb{R}

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Algebra 1 - Even/Odd Functions in Class Assignment

1. Describe the symmetry of an **even** function.
 graph: y axis symmetry
 algebraic: all exponents are even

2. Describe the symmetry of an **odd** function.
 graph: has 180° origin symmetry
 algebraic: all exponents are odd

3. Describe each graph as **EVEN**, **ODD**, or **NEITHER**.

4. $f(x) = x^2 + 2$ **EVEN**
 $g(x) = x^3 - 1$ **Neither**
 $h(x) = x^4 - 5$ **EVEN**
 $m(x) = x^2 + 3x - 2$ **Neither**
 $p(x) = x^5 - 1$ **ODD**
 $q(x) = x^6 + 2$ **even**

5. If the partially graphed function below is **EVEN** then finish what the rest of the graph should look like.

6. If the partially graphed function below is **ODD** then finish what the rest of the graph should look like.

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Test Review

28) $c + a = 90$: quantity
 $3c + 5a = 328$: price

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Even and Odd Functions Notes

GRAPHICALLY:
 A function is **even** if the $f(x)$ has y axis reflect symmetry
 A function is **odd** if the $f(x)$ has 180° rotational symmetry

Draw an example of an odd and even function.

ODD **EVEN**

Neither Even nor Odd:

ALGEBRAICALLY
 A function is **even** all exponents are even
 A function is **odd** all exponents are odd
 A function is **neither** exponents are a mixture of even and odd

*BE CAREFUL! because -8 is an **EVEN** EXPONENT, (-8) can be written with a variable x^0 which makes it an even exponent!

Examples:

Even	Odd	Neither
$y = x^2$	$y = x^3$	$y = x^2 + 1$

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Algebra 1 - Day 3, 2/12/2018 Arithmetic Sequences Notes

Arithmetic Sequences are a function with a common difference
 The recursive formula is $a_n = a_{n-1} + d$ & helps you find small n's
 The explicit formula is $a_n = a_1 + d(n-1)$ & helps you find large n's

Examples: Find the common difference, then write the recursive formula & the explicit formula.

Sequence	Common Difference	Recursive Formula	Explicit Formula
7, 31, 35, 39, ...	4	$a_n = a_{n-1} + 4$	$a_n = 27 + 4(n-1)$
4, -3, -10, -17, ...	-7	$a_n = a_{n-1} - 7$	$a_n = 4 + 7(n-1)$

Find the first five terms of the arithmetic sequence defined as follows:
 $a_1 = 2.7n + 0.5$
 $n=1: a_1 = 2.7(1) + 0.5 = 3.2$
 $n=2: a_2 = 2.7(2) + 0.5 = 5.9$
 $n=3: a_3 = 2.7(3) + 0.5 = 8.6$
 $n=4: a_4 = 2.7(4) + 0.5 = 11.3$
 $n=5: a_5 = 2.7(5) + 0.5 = 14$

Find the first five terms of the arithmetic sequence defined as follows:
 $a_n = 2n + 22$
 $n=1: a_1 = 2(1) + 22 = 24$
 $n=2: a_2 = 2(2) + 22 = 26$
 $n=3: a_3 = 2(3) + 22 = 28$
 $n=4: a_4 = 2(4) + 22 = 30$
 $n=5: a_5 = 2(5) + 22 = 32$

You have read 25 pages of a book. You plan to read an additional 10 pages each night.

a. List the first five terms of the sequence.
 $a_1 = 25$ $a_2 = 35$ $a_3 = 45$ $a_4 = 55$ $a_5 = 65$

b. Write the explicit formula to represent the number of pages you will read after n nights.
 $a_n = 10n + 15$
 $a_n = 25 + 10(n-1)$

You are going to read a book that has 105 pages. You expect to spend 15 minutes each day. You want to finish the book remaining at the end of the vacation.

a. Write explicit formula to represent this scenario.
 $a_n = 105 + 15(n-1)$
 $a_1 = 105$ $a_2 = 120$ $a_3 = 135$ $a_4 = 150$ $a_5 = 165$

b. For how many days can you spend 15 min each day?
 $a_1 = 105$ $a_2 = 105 - 15 = 90$ $a_3 = 90 - 15 = 75$ $a_4 = 75 - 15 = 60$
 $a_5 = 60 - 15 = 45$ $a_6 = 45 - 15 = 30$
 6 days

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Find the first five terms of the arithmetic sequence defined as follows:
 $a_n = a_{n-1} + 22$; $a_1 = 18$

$n=2: a_2 = 18 + 22 = 40$
 $n=3: a_3 = 40 + 22 = 62$
 $n=4: a_4 = 62 + 22 = 84$
 $n=5: a_5 = 84 + 22 = 106$

$n=2: a_2 = a_1 - 22 = 18 - 22 = -4$
 $n=3: a_3 = a_2 - 22 = -4 - 22 = -26$
 $n=4: a_4 = a_3 - 22 = -26 - 22 = -48$
 $n=5: a_5 = a_4 - 22 = -48 - 22 = -70$

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February 13, 2019 Wednesday

even, odd or neither?

1) $f(x) = x^2$ **Even**

2) $f(x) = x^3 - 4x$ **Neither**

3) $f(x) = x^5 - 4x^3$ **Neither**

Determine if the sequence is arithmetic. If it is, find the common difference.

1) 107, 1077, 10777, 107777, ...
 $1077 - 107 = 970$
 $10777 - 1077 = 9700$
NO

2) 35, 15, -5, -25, ...
 $15 - 35 = -20$
 $-5 - 15 = -20$
 $-25 - (-5) = -20$
Yes $d = -20$

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Algebra 1 - Day 3, 2/12/2019 Arithmetic Sequences HW Name _____

1. Write the recursive and explicit formula for the sequence: $10, 13, 16, 19$ $d=3$
 $a_1 = 10$ $a_n = a_{n-1} + 3$ $E: a_n = 10 + (n-1)3$

2. What is the common difference for the following sequence?
 $c = 12$ $d = 5$

3. The first three terms of a sequence are 12, 22, 32...
 a) What is the recursive formula for this sequence?
 $a_1 = 12$
 $a_n = a_{n-1} + 10$
 b) Write an explicit formula for the sequence.
 $a_n = 2 + (n-1)10$
 $a_1 = 2$ $a_2 = 12$ $a_3 = 22$
 $a_{30} = 2 + (30-1)10$
 $a_{30} = 292$

4. You have donated \$50 to charity. You plan to donate an additional \$15 each month.
 a) Write the first five terms of the sequence.
 $a_1 = 50$ $a_2 = 65$ $a_3 = 80$
 $a_4 = 95$ $a_5 = 110$
 b) Write an explicit formula to represent the sequence.
 $a_n = 100 + (n-1)15$

5. An arithmetic sequence is given by the following table. Write the recursive and explicit formulas.

n	1	2	3	4	5
a _n	7	10	13	16	19

R: $a_1 = 7$ $d = 10 - 7 = 3$ $E: a_n = 7 + (n-1)3$
 $a_n = a_{n-1} + 3$

6. An arithmetic sequence is given by the following formula: $a_n = a_1 + (n-1)d$ Rorf?
 a) Find the first 5 terms of the sequence.
 $a_1 = 2$
 $a_2 = 9$
 $a_3 = 16$
 $a_4 = 23$
 $a_5 = 30$

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Even/Odd Functions HW/Practice Tell whether the function is even, odd, or neither.

 $f(x) = x^2 - x^2$ Neither	 $f(x) = -x^2 + 2x$ Neither	 $f(x) = x^3 + 4x + 1$ Neither
 Even	 Odd	 Odd
 Even	 Odd	 Odd

Can a linear function ever be even or odd? If so, sketch an example.

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Algebra 1 Unit 2B Test - Study Guide Name _____

1. For the given function $f(x) = 2x + 7$, find $f(2)$ and $f(-2)$.
 $f(2) = 11$ $f(-2) = 3$

2. For the given function $f(x) = 4x - 2$, find the domain and range.
 Domain: $\{x | x \in \mathbb{R}\}$
 Range: $\{y | y \in \mathbb{R}\}$

3. In the following table, find the domain and range.

x	1	2	3	4
f(x)	2	4	6	8

 Domain: $\{1, 2, 3, 4\}$
 Range: $\{2, 4, 6, 8\}$

4. Graph the function and determine the key characteristics.
 $f(x) = 2x + 4$

5. What is x when $f(x) = 5$?
 $x = 0.5$

6. What is the domain of the function?
 All real numbers

7. What is the end behavior of the function model?
 $f(x) = 2x + 4$
 As $x \rightarrow \infty$, $f(x) \rightarrow \infty$
 As $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$

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Rate of Change

9. Find the rate of change of the following ordered pairs: (1, 3) and (5, -9)
 $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-9 - 3}{5 - 1} = \frac{-12}{4} = -3$

10. Find the slope of the function $f(x) = -6x + 12$
 $m = -6$

11. The tables below model two linear functions.

Function 1		Function 2	
x	f(x)	x	f(x)
1	4	1	1
2	1	2	4
3	-2	3	7
4	-5	4	10

Which of the linear functions below has a slope greater than the slope of Function 1?
 a) $f(x) = 1.5x + 3$ b) $f(x) = -2x + 3$ c) $f(x) = 2x + 3$ d) $f(x) = 3x + 6$

12. The table to the right shows the relationship between the number of a term in a pattern and the value of that term. Write a formula to represent the table.

Term Number	Value of Term
1	2
2	5
3	8
4	11
5	14
6	17
7	20

13. The second term of an arithmetic sequence is $a_2 = 24$. The common difference is $d = -3$. Find the first term of the sequence.
 $a_1 = 27$ $a_2 = 24$ $a_3 = 21$ $a_4 = 18$ $a_5 = 15$

14. Pizza King sells pizza for \$6 per pizza and a \$4 delivery fee.
 a) Write a function to model this situation.
 $f(x) = 6x + 4$
 $a_n = 6n + 4$
 $a_0 = 6(0) + 4 = 4$
 $a_1 = 6(1) + 4 = 10$
 $a_2 = 6(2) + 4 = 16$
 $a_3 = 6(3) + 4 = 22$
 $a_4 = 6(4) + 4 = 28$

b) Complete the table.

n	a _n
0	4
1	10
2	16
3	22
4	28

c) How much money do you owe Pizza King for ordering 25 pizzas?
 $a_{25} = 6(25) + 4 = 154$

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February 14, 2019, Thursday

1&2) For $f(x) = 3x + 2$, find $f(x)$ when $x = 7$ and when $x = -4$.
 $f(7) = 3(7) + 2 = 23$
 $f(-4) = 3(-4) + 2 = -10$

3) Evaluate the following function when $x = 0$.
 $f(x) = 2x + 3$
 $f(0) = 2(0) + 3 = 3$

4) Evaluate the following function when $f(x) = 5$.
 $f(x) = 2x - 3$
 $5 = 2x - 3$
 $+3$
 $8 = 2x$
 $\div 2$
 $4 = x$

Common Difference for Arithmetic Sequence
 Find the Common Difference
 2, 4, 6, 8, ...
 Common difference: 2

Arithmetic Recursive Formula (for small n's)
 $a_1 = a$
 $a_n = a_{n-1} + d$

Arithmetic Explicit Formula (for large n's)
 $a_n = a_1 + (n-1)d$

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$a_5 = 2(5) + 5 = 35$
 $a_n = 2n + 5$
 $a_{10} = 2(10) + 5 = 25$
 $a_{17} = 2(17) + 5 = 39$
 $a_{30} = 2(30) + 5 = 65$
 $a_{48} = 2(48) + 5 = 97$

Determine if the following are even, odd, or neither.
 16. $f(x) = -5x^2 + 3x^2 - 1$ Neither
 17. $f(x) = 2x^2 + 4$ ODD
 18. $f(x) = 2x^2 + 7x$ Neither

19. Even
 20. ODD
 21. Neither

22. Jalen makes \$14 per hour babysitting plus a flat rate of \$5 for gas for each hour.
 $a_n = 14x + 5$
 $m = 14$
 $b = 5$

23. For the following table:

x	1	2	3	4	5	6
y	1	4	9	16	25	36

 a) Is the relation a function? Yes
 b) What is the domain? x -values: 1, 2, 3, 4, 5, 6
 c) What is the range? y -values: 1, 4, 9, 16, 25, 36
 d) What is the rate of change? $m = \frac{4-1}{2-1} = 3$
 $a_2 - a_1 = 4 - 1 = 3$

24. Determine if the following are functions.
 a) Not a function
 b) Function

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Algebra I Name _____ ID: 1
 Practice with Arithmetic Sequences Date _____ Period _____
 State if each sequence is arithmetic.
 1) 1, 5, 25, 125, ... 2) $-1, -9, -17, -25, \dots$
 3) $-1, -4, -16, -64, \dots$ 4) $-27, 3, 33, 63, \dots$
 5) $-30, -14, -6, -2, \dots$ 6) $-7, -16, -25, -34, \dots$
 7) $-40, -48, -56, -64, \dots$ 8) $-1, 1, 5, 13, \dots$
 Find the common difference.
 9) 35, 41, 47, 53, ... 10) 16, 13, 10, 7, ...
 11) 29, 33, 37, 41, ... 12) 7, 1, -5, -11, ...

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13) $-7, 1, 9, 17, \dots$ 14) $-34, -39, -44, -49, \dots$
 15) 16, 6, -4, -14, ... 16) 8, 28, 48, 68, ...
 Determine if the sequence is arithmetic. If it is, find the three terms in the sequence after the last one given.
 17) $-36, -32, -28, -24, \dots$ 18) 42, 421, 4211, 42111, ...
 19) $-5, -3, 0, 4, \dots$ 20) 32, 34, 36, 38, ...
 21) 3, 1, -1, -3, ... 22) 1, 9, 25, 49, ...
 23) $-1, -2, -4, -8, \dots$ 24) 16, 12, 8, 4, ...

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Determine if the sequence is arithmetic. If it is, find the recursive formula.
 25) $-16, -6, 4, 14, \dots$ 26) $-30, -50, -70, -90, \dots$
 27) 37, 30, 23, 16, ... 28) 17, $k, -1, -10, \dots$
 29) $-14, -8, -2, 4, \dots$ 30) $-40, -49, -58, -67, \dots$
 31) 1, 10, 19, 28, ... 32) $-29, -22, -15, -8, \dots$
 Find the explicit formula.
 33) $-23, -25, -27, -29, \dots$ 34) $-36, 64, 164, 264, \dots$
 35) $-24, -33, -42, -51, \dots$ 36) 4, 104, 204, 304, ...

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Determine if the sequence is arithmetic. If it is, find the recursive formula.
 25) $-16, -6, 4, 14, \dots$ 26) $-30, -50, -70, -90, \dots$
 27) 37, 30, 23, 16, ... 28) 17, $k, -1, -10, \dots$
 29) $-14, -8, -2, 4, \dots$ 30) $-40, -49, -58, -67, \dots$
 31) 1, 10, 19, 28, ... 32) $-29, -22, -15, -8, \dots$
 Find the explicit formula.
 33) $-23, -25, -27, -29, \dots$ 34) $-36, 64, 164, 264, \dots$
 35) $-24, -33, -42, -51, \dots$ 36) 4, 104, 204, 304, ...

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Function Notation NAME: _____ DATE: _____
 1. Evaluate the following expressions given the functions below:
 $g(x) = -3x + 1$ $f(x) = x^2 + 7$ $h(x) = \frac{12}{x}$ $j(x) = 2x + 9$
 a. $g(10) =$ b. $f(3) =$ c. $h(-2) =$
 d. $f(7) =$ e. $h(6) =$ f. $g(6) =$
 b. Find x if $g(x) = 16$ i. Find x if $h(x) = -2$ j. Find x if $f(x) = 23$
 2. Change the following statements into coordinate points and then plot them!
 a. $f(-1) = 1$
 b. $f(2) = 7$
 c. $f(1) = -1$
 d. $f(3) = 0$

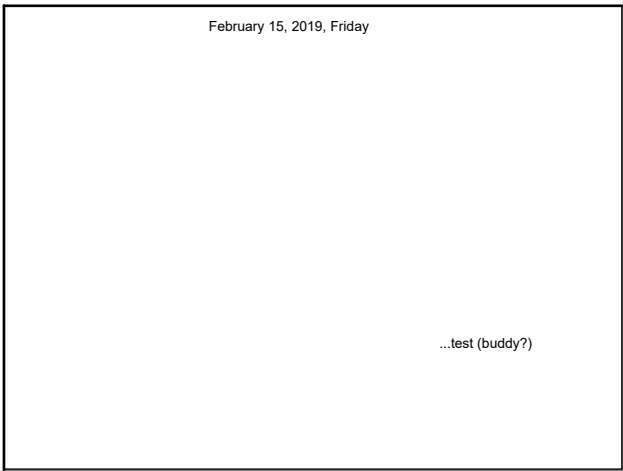
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3. Given this graph of the function $f(x)$:

Find:
 a. $f(-4) =$ b. $f(0) =$ c. $f(3) =$ d. $f(-5) =$
 e. x when $f(x) = -2$ f. x when $f(x) = 0$

APPLICATION
 4. Swine flu is attacking the North Pole. The function below determines how many elves have swine flu where t = time in days and S = the number of people in thousands.
 $S(t) = 9t - 4$
 a. Find $S(4)$.
 b. What does $S(4)$ mean?
 c. Find t when $S(t) = 23$.
 d. What does $S(t) = 23$ mean?
 e. Graph the function.

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