

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): as the x increases
- 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 - $\rightarrow 0$ 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 in y) to the horizontal (change in 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 11:00 (Celsius evaporating).
 $m = \frac{13.5 - 4.5}{6 - 2} = \frac{9}{4} = 2.25$

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

What is the value?
 $x = -4 \rightarrow y = 4$ $m = \frac{5 - 0}{-4 - 3} = \frac{5}{-7} = -\frac{5}{7}$
 $x = -4 \rightarrow y = 3$ $m = \frac{5 - 0}{-4 - 3} = \frac{5}{-7} = -\frac{5}{7}$
 $x = 3 \rightarrow y = 6$ $m = \frac{7 - 0}{6 - 3} = \frac{7}{3} = 2.33$
 $x = 6 \rightarrow y = 8$ $m = \frac{7 - 0}{6 - 8} = \frac{7}{-2} = -3.5$

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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 over 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.

a) $x = -1$ to $x = 1$: $m = \frac{6 - 3}{1 - (-1)} = \frac{3}{2} = 1.5$

b) $x = 0$ to $x = 4$: $m = \frac{192 - 7.5}{4 - 0} = \frac{184.5}{4} = 46.125$

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

d) $x = -1$ to $x = 4$: $m = \frac{34 - 1}{4 - (-1)} = \frac{33}{5} = 6.6$

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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. Describe each function below as EVEN, ODD, or NEITHER

a. $f(x) = x^2 + 2$ → **EVEN**
 b. $g(x) = x^3 - 1$ → **NEITHER**
 c. $h(x) = x^2 - 3$ → **EVEN**
 d. $m(x) = x^3 + 2x$ → **ODD**
 e. $p(x) = x^2 + 1$ → **NEITHER**
 f. $q(x) = x^3 - 2x$ → **ODD**

If the partially graphed function below is **EVEN** 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.

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 -8) which makes it an even exponent!

Examples:

| | | |
|-----------|-----------|-----------------|
| Even | Odd | Neither |
| $y = x^2$ | $y = x^3$ | $y = x^2 + x$ |
| $y = x^4$ | $y = x^5$ | $y = x^3 + x^2$ |

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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 each day. You want to buy \$30 remaining at the end of the vacation.

a. Write explicit formula to represent this scenario.
 $a_n = a_1 + d(n-1)$
 $a_1 = 105 + 15(n-1)$
 $d = -15$

b. For how many days can you spend \$15 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:

$a_n = a_{n-1} + 22; a_1 = 18$

$n=2: a_2 = a_1 + 22 = 18 + 22 = 40$
 $n=3: a_3 = a_2 + 22 = 40 + 22 = 62$
 $n=4: a_4 = a_3 + 22 = 62 + 22 = 84$
 $n=5: a_5 = a_4 + 22 = 84 + 22 = 106$

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

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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 formulas for the sequence: $a_1 = 2, 10, 13, 16, 19, \dots$
 $a_n = 2 + (n-1)10$
 $a_n = 10n - 8$

2. What is the common difference for the following sequence: $1, 11, 21, 31, \dots$
 $d = 10$

3. The first three terms of a sequence are 12, 22, 32, ...
 a) What is the recursive formula for the sequence?
 $a_n = 10n - 10$
 b) Write the explicit formula for the sequence.
 $a_n = 2 + (n-1)10$
 $a_n = 10n - 8$

4. You have \$100 in a bank account. You plan to donate an additional \$15 each month.
 a) Write the first five terms of the sequence.
 $a_1 = 100, a_2 = 85, a_3 = 70, a_4 = 55, a_5 = 40$
 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 |

$d = 10 - 7 = 3$
 $a_n = 7 + (n-1)3$
 $a_n = 3n + 4$

6. An arithmetic sequence is given by the following formula: $a_n = 2n + 3$
 a) Find the first 5 terms of the sequence.
 $a_1 = 5, a_2 = 7, a_3 = 9, a_4 = 11, a_5 = 13$

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

| | | |
|---|-----------------------------------|--------------------------------------|
| $f(x) = x^2 - x^2$ Even | $f(x) = -x^2 + 2x$ Neither | $f(x) = x^3 + 4x + 1$ Neither |
| $f(x) = \frac{1}{2}x^4 + 9$ Even | $f(x) = 5x + 1$ Neither | $f(x) = 5$ Even |

Can a linear function ever be even or odd? If so, sketch an example.
 Yes, $f(x) = 0$ is both even and odd.

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Algebra 1 Unit 2B Test - Study Guide Name _____

1. For the given function $f(x) = 2x + 7$, find $f(-2)$.
 $f(-2) = 2(-2) + 7 = -4 + 7 = 3$

2. For the given function $f(x) = 2x + 7$, find $f(2)$.
 $f(2) = 2(2) + 7 = 4 + 7 = 11$

3. In the following table, find the domain using the context.

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|------------|------|------|------|------|------|------|------|------|------|------|------|
| Population | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 |

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

Domain: \mathbb{R}
 Range: \mathbb{R}
 x-intercept: $(-2, 0)$
 y-intercept: $(0, 4)$
 Increasing/Decreasing? Increasing
 Where? $(-\infty, \infty)$
 End behavior: $x \rightarrow \infty, y \rightarrow \infty$
 $x \rightarrow -\infty, y \rightarrow -\infty$

5. What is x when $f(x) = 5$?
 $5 = 2x + 4 \Rightarrow 1 = 2x \Rightarrow x = 0.5$

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

7. What is the end behavior of a graph that approaches positive infinity?
 $f(x) \rightarrow \infty$

8. Write the function being modeled by the slope graph.
 $y = mx + b$
 $f(x) = mx + b$
 $f(x) = 3x - 4$

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Rate of Change

9. Find the rate of change of the following ordered pairs: $(10, 1)$ and $(15, -9)$.
 $\frac{-9 - 1}{15 - 10} = \frac{-10}{5} = -2$

10. Find the slope of the function: $3x - 6y = 12$

11. The tables below model two linear functions.

| Function 1 | | Function 2 | |
|------------|------|------------|------|
| x | f(x) | x | f(x) |
| 1 | 3 | 1 | 5 |
| 2 | 1 | 2 | 4 |
| 3 | -1 | 3 | 3 |
| 4 | -3 | 4 | 2 |

Which of the linear functions below has a slope greater than the slope of Function 1 but less than the slope of Function 2?
 a. $f(x) = -1.5x - 2$ b. $f(x) = -2x - 4$ c. $f(x) = -2.5x + 3$ d. $f(x) = -3x + 6$

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

| Term Number | Value of Term |
|-------------|---------------|
| 1 | 2 |
| 2 | 7 |
| 3 | 12 |
| 4 | 17 |
| n | ? |

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.
 $a_2 = a_1 + d \Rightarrow 24 = a_1 - 3 \Rightarrow a_1 = 27$

14. Pizza King sells pizza for \$6 per pizza and a \$4 delivery fee.
 a. Write a function to model this situation.
 $f(x) = 6x + 4$
 b. Complete the table.

| n | a _n |
|---|----------------|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |

 c. How much money do you owe Pizza King for ordering 25 pizzas?
 $f(25) = 6(25) + 4 = 150 + 4 = 154$

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February 14, 2019, Thursday

18.2) For $f(x) = 3x + 2$, find $f(x)$ when $x = 7$ and when $x = -4$.

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

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

Common Difference for Arithmetic Sequence
 Find the Common Difference
 $2, 4, 6, 8, \dots$
 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)
 $a_n = a + (n-1)d$

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15. Find a_{12} for the sequence $a_n = 2n + 5$.
 $a_{12} = 2(12) + 5 = 24 + 5 = 29$

16. Write a function that could be used to represent the sequence: 5, 11, 17, 23, ...
 $f(x) = 6x - 1$

17. Find a_5 for the sequence $a_n = 2n - 12$.
 $a_5 = 2(5) - 12 = 10 - 12 = -2$

Determine if the following are even, odd, or neither.

16. $f(x) = -5x^2 + 3x - 1$
 17. $f(x) = 2x^2 + x$
 18. $f(x) = 2x^4 + 7x^2 - 7$

19.
Even

20.
Neither

21.
Odd

22. Jalen makes \$14 per hour babysitting plus a flat rate of \$5 for gas. Write the function. Name the slope and y-intercept.
 $f(x) = 14x + 5$

23. For the following table:

| x | 1 | 2 | 3 | 4 | 5 | 6 |
|---|----|---|---|----|----|----|
| y | 10 | 7 | 4 | -2 | -5 | -8 |

a) Is the relation a function?
 b) What is the domain?
 c) What is the range?
 d) What is the rate of change?

26. Determine if the following are functions.
 a)
 b)
 c)
 d)

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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. $g(8) =$
 h. 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. $f(3) = 0$

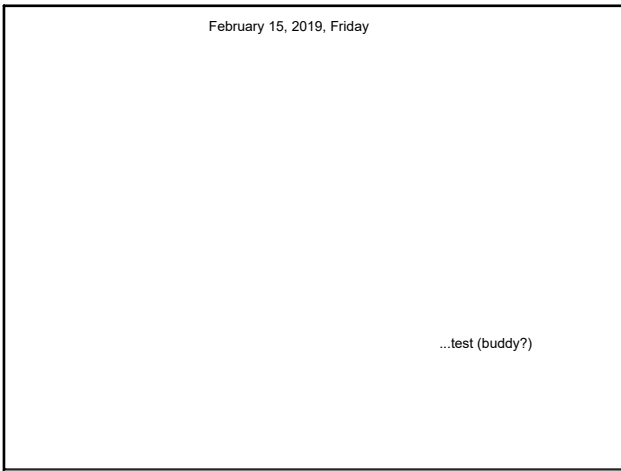
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3. Given this graph of the function $f(x)$:

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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