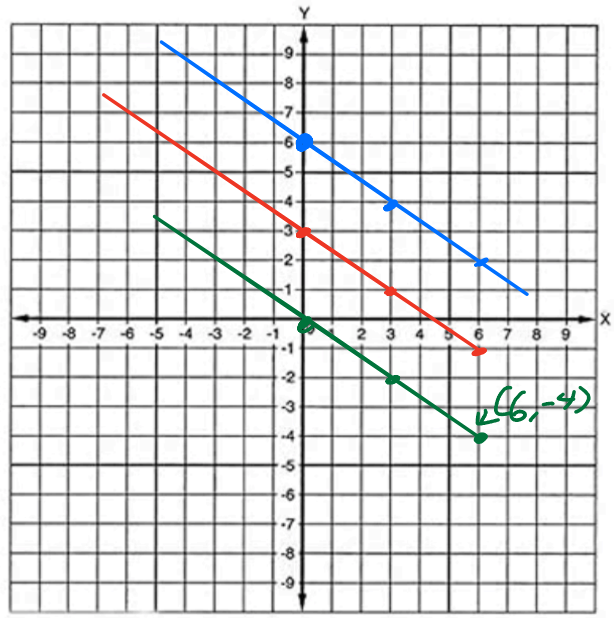
Period 4, Oct 8, 2024



Parallel Lines

Same Slope

Never Touch

$y = \frac{-2}{3}x + 6$ $\quad$ y-int = 6

Slope $= \frac{-2}{3} = \frac{\text{Rise}}{\text{Run}}$

$y = \frac{-2}{3}x + 3$ $\quad$ y-int = 3

Slope $= \frac{-2}{3} = \frac{\text{Rise}}{\text{Run}}$

Equation for a Line Parallel to $y = -\frac{2}{3}x + 6$

Through the Point (6, -4) $\quad m = -\frac{2}{3}$

$y = mx + b$

$y = -\frac{2}{3}x + b$

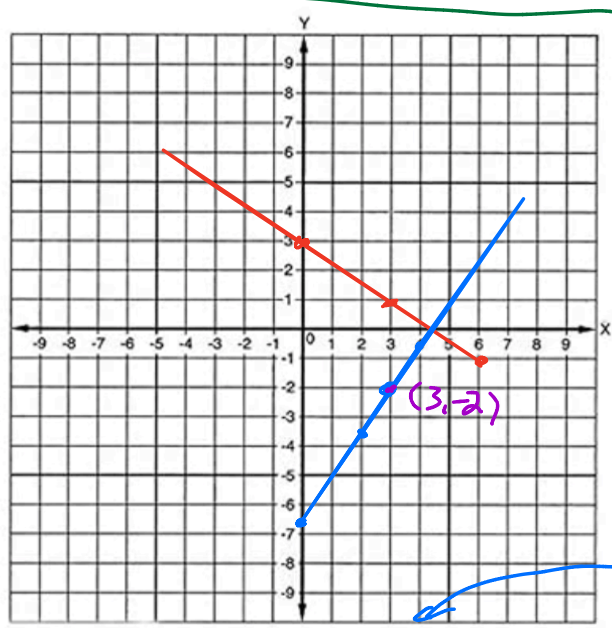
plug in

$-4 = -\frac{2}{3} \cdot 6 + b$

$-4 = -4 + b$

$0 = b$

$y = -\frac{2}{3}x + 0$



Perpendicular Lines

Slope $\frac{a}{b} \Rightarrow -\frac{b}{a}$

$y = -\frac{2}{3}x + 3$ $\quad m = \frac{-2}{3}$

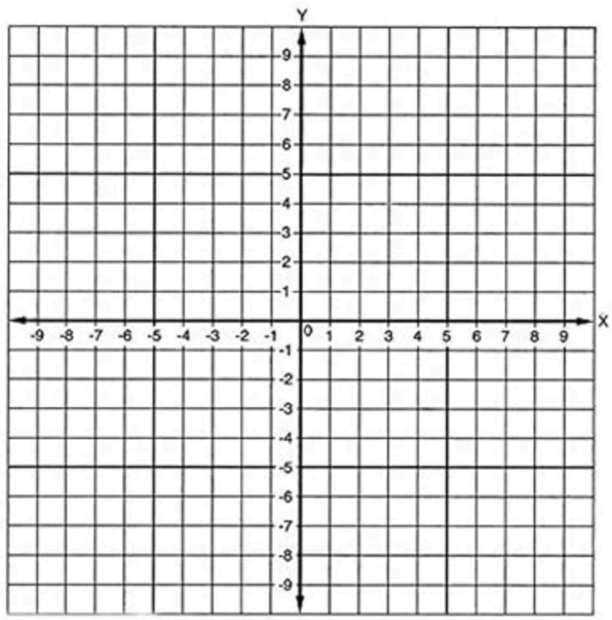
Perpendicular Slope

$m = +\frac{3}{2}$

Through (3, -2) $\quad -6\frac{1}{2} = b$

$-2 = \frac{3}{2}(3) + b \Rightarrow -2 = \frac{9}{2} + b \Rightarrow -2 - \frac{9}{2} = b$

$y = \frac{3}{2}x - 6\frac{1}{2}$ $\qquad y = +\frac{3}{2}x + b$


Y
X
9
8
7
6
5
4
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2
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-1
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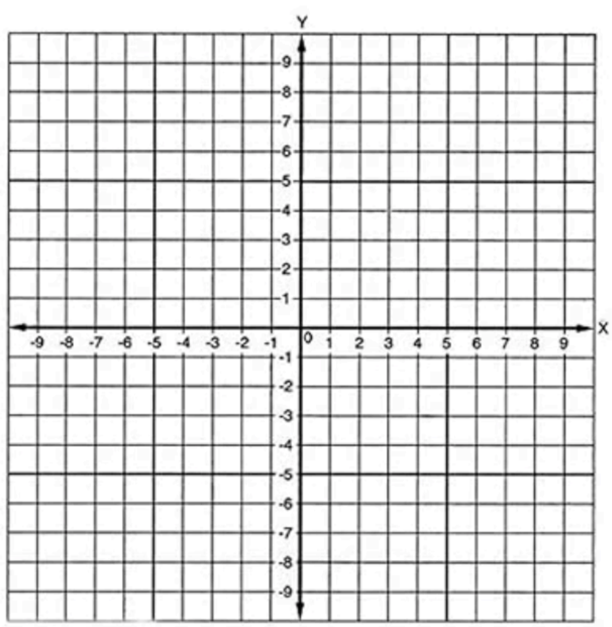
1 2 3 4 5 6 7 8 9


Y
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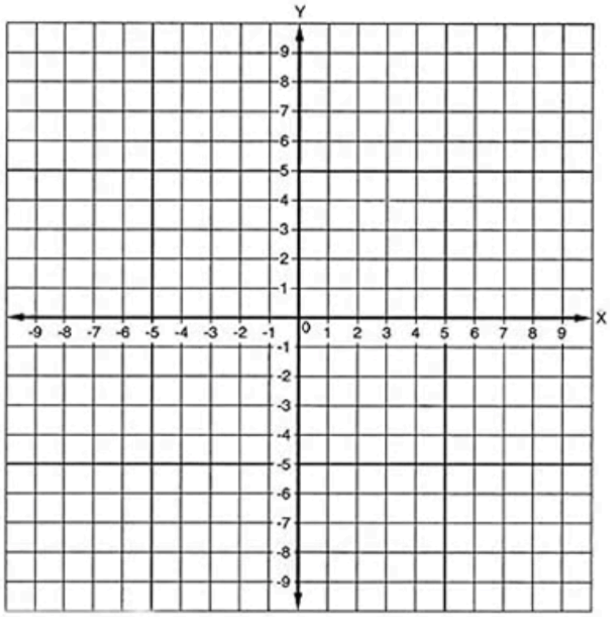
-9 -8 -7 -6 -5 -4 -3 -2 -1
1 2 3 4 5 6 7 8 9

ax+by+c=d.   Find slope

solve for y



$$ax+by+c=d$$
$$\quad -c \quad -c$$

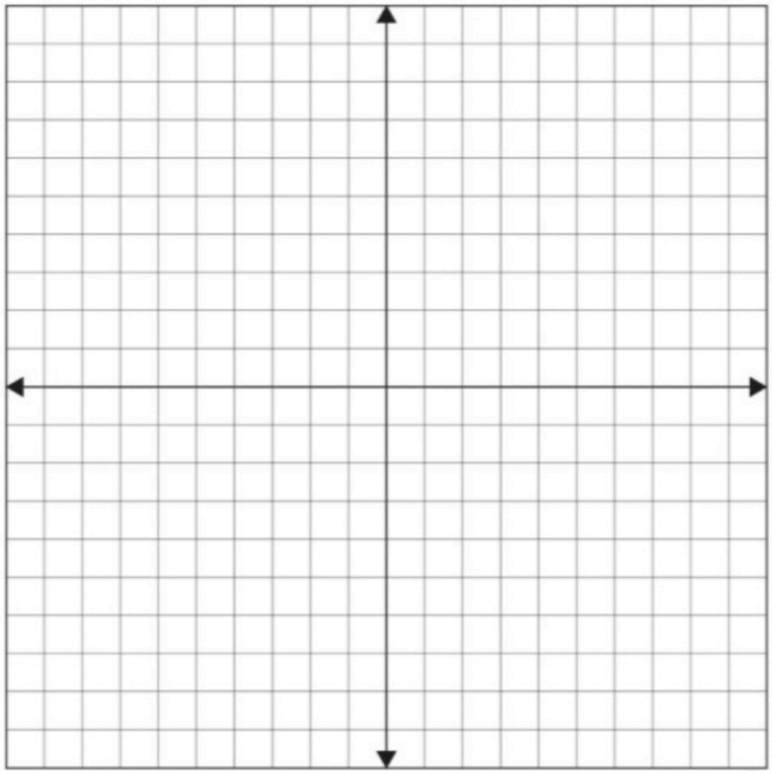
$$\cancel{ax}+by=d-c$$
$$-ax \qquad -ax$$

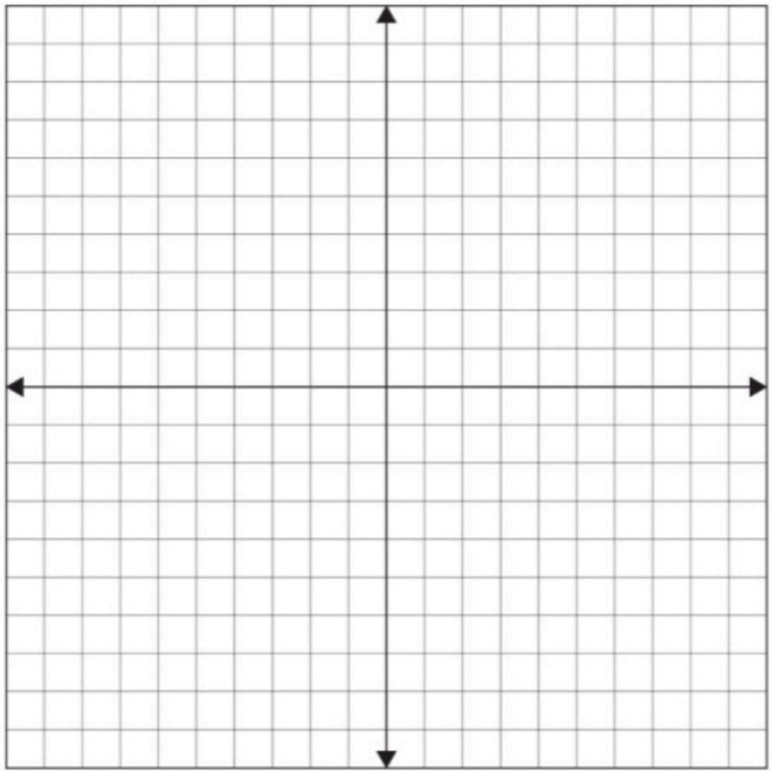
$$\frac{by}{b}=\frac{d-c-ax}{b}$$

$$y=-\frac{a}{b}\cdot x+\frac{d-c}{b}$$

$$\text{Slope}=-\frac{a}{b}$$

$$y\text{-int}=\frac{d-c}{b}$$

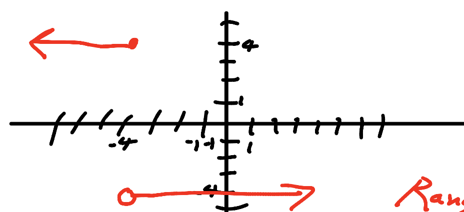




Evaluate the piecewise function at the given values of the independent variable.

$$f(x) = \begin{cases} 3x+5 & \text{if } x<0 \\ 3x+6 & \text{if } x \geq 0 \end{cases}$$

(a) $f(-3)$
(b) $f(0)$
(c) $f(1)$



Range
4 or -4

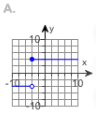
y = 4 when x ≤ -4

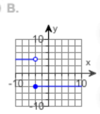
The domain of the piecewise function is $(-\infty,\infty)$.
a. Graph the function.
b. Use your graph to determine the function's range.

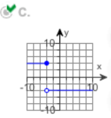
$$f(x) = \begin{cases} 4 & \text{if } x \leq -4 \\ -4 & \text{if } x > -4 \end{cases}$$

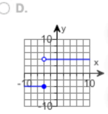
y = -4 when x > -4

a. Choose the correct graph below.

A.


B.


C.


D.


b. What is the range of the entire piecewise function? Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

A. The range does not have any isolated values. It can be described by ☐. (Type your answer in interval notation.)

B. The range has at least one isolated value. It can be described as the union of the interval(s) ☐ and the set {☐}. (Use a comma to separate answers as needed.)

C. The range consists exclusively of one or more isolated values. It can be described as $\{-4,4\}$. (Use a comma to separate answers as needed.)

The domain of the piecewise function is $(-\infty, \infty)$.
a. Graph the function.
b. Use your graph to determine the function's range.

$$f(x) = \begin{cases} \frac{1}{2}x^2 & \text{if } x < 3 \\ 2x - 1 & \text{if } x \geq 3 \end{cases}$$

parabola $x < 3$

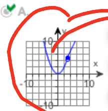
Line $x \geq 3$

$\frac{1}{2}(3)^2 = \frac{9}{2} = 4\frac{1}{2}$

$2 \cdot 3 - 1 = 5$

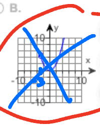
a. Choose the correct graph below.

A.

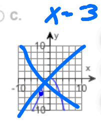


Parabola opens up

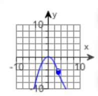
B. $x = -3$



C. $x = 3$



D.



b. What is the range of the entire piecewise function? Select the correct choice below and, if necessary, fill in the answer box(es) to complete your choice.

Range $[0, \infty)$

$y \geq 0$

Find and simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$ for the given function.

$$f(x) = \frac{3}{x}$$

$F(x+h) = \frac{3}{x+h}$

$$\frac{\frac{x \cdot 3}{x \cdot (x+h)} - \frac{3(x+h)}{x(x+h)}}{h} = \frac{\frac{3x}{x(x+h)} - \frac{3x+3h}{x(x+h)}}{h}$$

$$\frac{\frac{\cancel{3x} - \cancel{3x} - 3h}{x(x+h)}}{\frac{h}{1}}$$

$$\frac{-3\cancel{h}}{x(x+h)} \cdot \frac{1}{\cancel{h}} = \frac{-3}{x(x+h)} = \frac{-3}{x^2 + xh}$$

Find the difference quotient of f; that is, find $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$, for the following function. Be sure to simplify.

$f(x) = x^2 - 3x + 8$

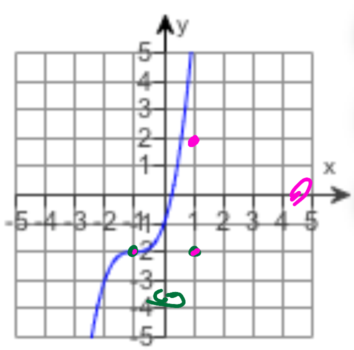
$F(x+h) = (x+h)^2 - 3(x+h) + 8 = (x^2 + 2xh + h^2) - 3x - 3h + 8$

$\frac{f(x+h)-f(x)}{h} = 2x + h - 3$ (Simplify your answer.)

$$\frac{x^2 + 2xh + h^2 - 3x - 3h + 8 - (x^2 - 3x + 8)}{h} = \frac{\cancel{x^2} + 2xh + h^2 \cancel{- 3x} - 3h \cancel{+ 8} \cancel{- x^2} \cancel{+ 3x} \cancel{- 8}}{h}$$

$$\frac{2xh + h^2 - 3h}{h} = \frac{\cancel{h}(2x + h - 3)}{\cancel{h}}$$

Use possible symmetry of the graph to determine whether it is the graph of an even function, an odd function, or a function that is neither even nor odd.



Symmetry y-axis

Nope

$(-1,-2)$ Exists

$(1,-2)$ nope

Symmetry origin

x-axis and y-axis

$(-1,-2)$ Exists

$(1,2)$ nope

$F(-x) = F(x)$ Even Function

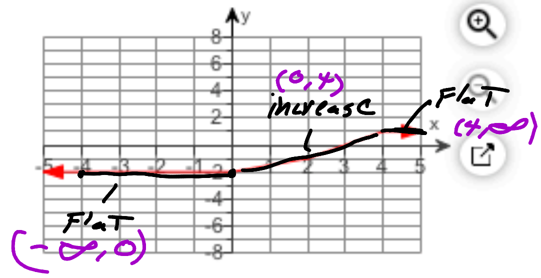
$F(-x) = -F(x)$ Odd Function

Use the graph to determine

(a) open intervals on which the function is increasing, if any.

(b) open intervals on which the function is decreasing, if any.

(c) open intervals on which the function is constant, if any.



(a) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

◉ A. The function is increasing on the interval(s) (0,4).
(Type your answer in interval notation. Use a comma to separate answers as needed.)

○ B. The function is never increasing.

(b) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The function is decreasing on the interval(s) ___.
(Type your answer in interval notation. Use a comma to separate answers as needed.)

◉ B. The function is never decreasing.

(c) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

◉ A. The function is constant on the interval(s) $(-\infty,0),(4,\infty)$.
(Type your answer in interval notation. Use a comma to separate answers as needed.)

○ B. The function is never constant.

Write a piecewise function that models the cellular phone billing plan described below. Let x represent the number of minutes used and C(x) represent the cost for those x minutes. Then graph the function.

$20.00 per month buys 350 minutes. Additional time costs $0.25 per minute.

Fill in the missing values or expressions for the piecewise function below.

$$C(x) = \begin{cases} 20.000 & \text{if } 0 \le x \le 350 \\ 0.25x - 67.50 & x > 350 \end{cases}$$

(Simplify your answer. Do not include the $ symbol in your answer.)

$X \le 350$ cosT $20

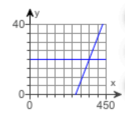
$x > 350$ cosT $20 + .25(X-350)$

$20 + .25x - 87.5$

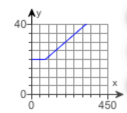
amouT of Time over 350

Choose the correct graph of the function.

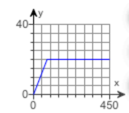
A.



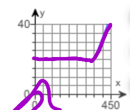
B.



C.

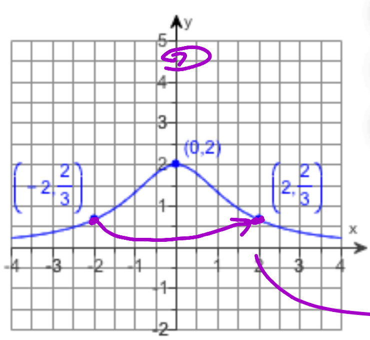


D.



FlaT unTil X=350
Then Line up

Use possible symmetry to determine whether the graph is the graph of an even function, an odd function, or a function that is neither even nor odd.



Symmetry over y-axis

Even

Find the difference quotient of f; that is, find $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$, for the following function. Be sure to fully simplify.

$f(x) = \sqrt{15x}$

$F(x+h) = \sqrt{15(x+h)}$

$$\frac{\left(\sqrt{15(x+h)} - \sqrt{15x}\right)}{h} \cdot \frac{\left(\sqrt{15(x+h)} + \sqrt{15x}\right)}{\left(\sqrt{15(x+h)} + \sqrt{15x}\right)}$$

$\cancel{15x} + 15h$

$$\frac{15(x+h) - \cancel{\sqrt{15(x+h)}\cdot\sqrt{15x}} + \cancel{\sqrt{15(x+h)}\cdot\sqrt{15x}} - \cancel{15x}}{h\left(\sqrt{15(x+h)} + \sqrt{15x}\right)} = \frac{15\cancel{h}}{\cancel{h}\left(\sqrt{15(x+h)} + \sqrt{15x}\right)}$$

Determine whether the function is even, odd, or neither. Then determine whether the function's graph is symmetric with respect to the y-axis, the origin, or neither.

$f(x) = x^6 - x^8 + 1$

Even

$F(-x) = F(x)$

$(-x)^6 - (-x)^8 + 1$

$x^6 - x^8 + 1 = F(x)$

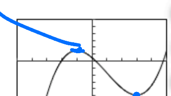
The graph and equation of the function f are given.

a. Use the graph to find any values at which f has a relative maximum, and use the equation to calculate the relative maximum for each value.

b. Use the graph to find any values at which f has a relative minimum, and use the equation to calculate the relative minimum for each value.

Max $(-1, 15)$

$f(x) = 2x^3 - 6x^2 - 18x + 5$



[−5,5,1] by [−60,60,10]

min $(3, -49)$

$2(-1)^3 - 6(-1)^2 - 18(-1) + 5$

$-2 - 6 + 18 + 5 = 15$

$-54 + 5 = -49$

$54 \cancel{-54} - 54 + 5 = 2(3)^3 - 6(3)^2 - 18(3) + 5$

$y - y_1 = m(x - x_1)$

Use the given conditions to write an equation for the line in point-slope form and in slope-intercept form.

Passing through (5,9) with x-intercept − 3

$y = mx + b$

equation for a Line need Slope and a Point

Point

$(5,9)$
$x_1\ y_1$

x-int −3

$(-3,0)$ point
$x_2\ y_2$

Find the Slope

$$m = \frac{0-9}{-3-5} = \frac{-9}{-8} = \frac{9}{8}$$

Point-Slope

$$y - 9 = \frac{9}{8}(x-5)$$

Slope-int
Solve for y=

$$y - 9 = \frac{9}{8}(x-5)$$

$$y - 9 = \frac{9}{8}x - \frac{45}{8} + \frac{72}{8}$$

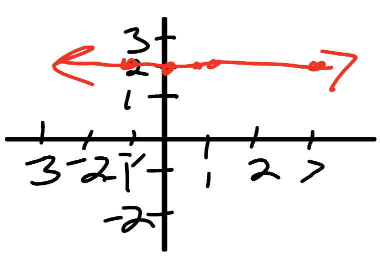
$+9$

$9 \cdot 8$
$1 \cdot 8$

$$y = \frac{9}{8}x + \frac{27}{8}$$

Graph the following equation in a rectangular coordinate system.

f(x) = 2 $\quad y = 2$



x	y
0	2
1	2
-1	2
.5	2
3	2

Other than a no solution set, use interval notation to express the solution set and then graph the solution set on a number line.

$$\frac{x-10}{6} \ge \frac{(x-5)2}{9\cdot 2} + \frac{7}{18}$$

$$\frac{x-10}{6} \ge \frac{2x-10+7}{18}$$

$$18\cdot\frac{x-10}{6} \ge \frac{2x-3}{\cancel{18}}\cdot\cancel{18}$$

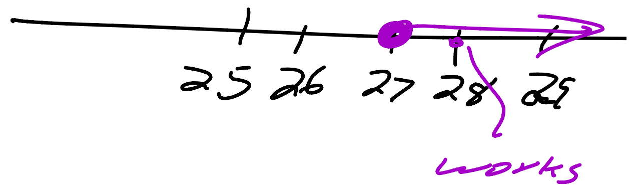
$$3(x-10) \ge 2x-3$$

$$3x-30 \ge 2x-3$$

$$-2x+30 \quad -2x+30$$

$$x \ge 27$$

$28 \ge 27$ True



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extra homework due Tuesday oct 8

1) $F(x) = 7x^3 + 2x - 4$

$F(x+h) = ?$

2) $F(x) = 5(x)^4 + 3x^3 - 1$

$F(x+h) = ?$

3) $F(x) = 5x^2 - 2x + 4$

$F(x+h)$

4) $F(x) = 6x^2 + 2x - 3$

$$\frac{F(x+h) - F(x)}{h} =$$

5) $F(x) = \sqrt{x^2+2}$

$$\frac{F(x+h) - F(x)}{h} =$$

(

5) $F(x) = \sqrt{x^2+2}$

$$\frac{F(x+h) - F(x)}{h} =$$

$$F(x+h) = \sqrt{(x+h)^2+2} = \sqrt{x^2+2xh+h^2+2}$$

$$\frac{\left(\sqrt{(x+h)^2+2} - \sqrt{x^2+2}\right)}{h} \cdot \frac{\left(\sqrt{(x+h)^2+2} + \sqrt{x^2+2}\right)}{\left(\sqrt{(x+h)^2+2} + \sqrt{x^2+2}\right)}$$

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a) $F(x) = 5(x)^4 + 3x^3 - 1$

$F(x+h) = ?$

$$F(x+h) = 5(x+h)^4 + 3(x+h)^3 - 1$$

$$5(1x^4 + 4x^3h + 6x^2h^2 + 4xh^3 + 1h^4)$$

$+$

$$3(1x^3 + 3x^2h + 3xh^2 + 1h^3)$$

```
    1
   1 1
  1 2 1
 1 3 3 1
1 4 6 4 1
```

$$5x^4 + 20x^3h + 30x^2h^2 + 20xh^3 + 5h^4 + 3x^3 + 9x^2h + 9xh^2 + 3h^3 - 1$$