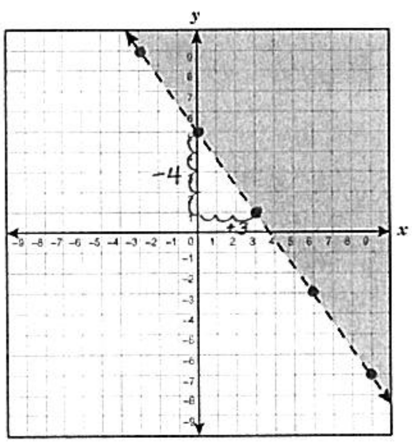
STATION #1 – *Linear Inequalities*

1. Write an inequality that represents the graph pictured below.



slope = $\frac{\text{rise}}{\text{run}}$

$= \frac{-4}{3}$

y-intercept = 5

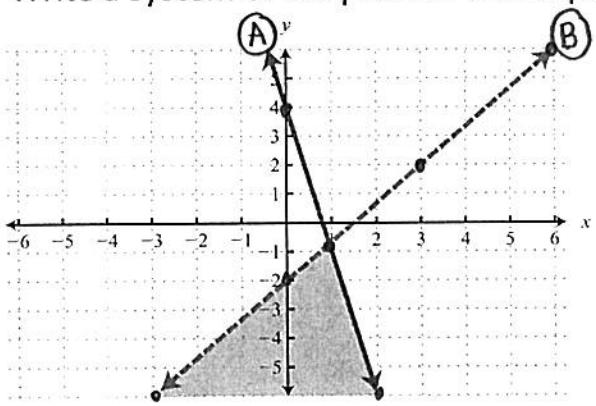
$\boxed{y > -\frac{4}{3}x + 5}$

$\boxed{\text{or}}$ (0, 5) (3, 1)

$\frac{\Delta y}{\Delta x} = \frac{1-5}{3-0} \rightarrow \frac{-4}{3}$

$>$ shade above dashed line

2. Write a system of inequalities that represent the graph pictured below.



(A) slope = $\frac{\text{rise}}{\text{run}}$

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

$= -5$

y-int: 4

shade below, solid } $\le$

(B) slope = $\frac{\text{rise}}{\text{run}}$

$= \frac{4}{3}$

y-int: -2

shade below, dashed } $<$

$\boxed{y \le -5x + 4 \qquad y < \frac{4}{3}x - 2}$

3. A clothing manufacturer has 1000 yards of cotton to make shirts and pajamas. A shirt requires 1 yd. of fabric and a set of pajamas requires 2 yd. of fabric. It takes 2 hours to make a shirt and 3 hours to make a pair of pajamas, and there are only 1600 hours available to make the clothing.

   a) Write a system of inequalities that can be used to determine the number of shirts, ***x***, and the number of sets of pajamas, ***y***, the clothing manufacturer can make given the constraints above.
   Helpful Hint: One inequality represents the amount of fabric used and the other represents the amount of hours it takes to produce the clothing.

   b) Using your system, determine if it is possible to make 300 shirts and 350 pairs of pajamas.

Station #1

3) a) x = # of shirts

y = # of pajamas

# of yards $\quad x + 2y \leq 1000$

# of hours $\quad 2x + 3y \leq 1600$

b) $x = 300$ shirts
$y = 350$ pajamas

$300 + 2(350) \leq 1000$
$300 + 700 \leq 1000$
$1000 \leq 1000$
True

$2(300) + 3(350) \leq 1600$
$600 + 1050 \leq 1600$
$1650 \leq 1600$
False

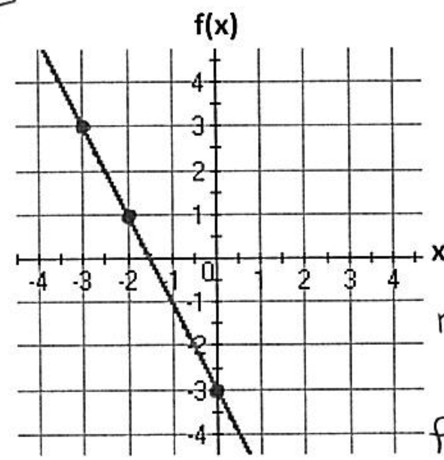
No, it is not possible because one inequality in the system is false

STATION #2 – *Function Notation and Sequences*

1. If $h(x) = x^4 - 5x$ then find h(-1).

$h(-1) = (-1)^4 - 5(-1)$
$h(-1) = 1 + 5$
$\boxed{h(-1) = 6}$

2. Consider the linear function **f(x)** shown here.



$m = -2$
$b = -3$
$f(x) = -2x - 3$

a) Find the value of f(-2).
input(x)
$(-2, 1)$
$\boxed{f(-2) = 1}$

b) For what value of x does f(x) = 3?
output
$(-3, 3)$
$\boxed{x = -3}$

c) For what value of x does f(x) = -3?
$(0, -3)$
$\boxed{x = 0}$

3. A soccer coach is getting her team ready for the season by introducing them to High Intensity Interval Training (HIIT). The table below represents a list of exercises for an HIIT training circuit and the length of time that must be spent on each exercise before the athlete gets a short time to rest. The rest time increases as the athletes complete more exercises in the circuit.

n | E(n) | R(n)

Exercise #	Length of Exercise Time	Length of Rest Time
Exercise 1	0.5 minute	0.25 minute
Exercise 2	0.75 minute	0.5 minute
Exercise 3	1 minute	1 minute
Exercise 4	1.25 minutes	2 minutes
Exercise 5	1.5 minutes	4 minutes

$d = .25$ $r = 2$

a) Write an explicit rule to represent the amount of minutes spent exercising, ***E*(*n*)**, on the *n*th exercise.
$E(n) = 0.5 + 0.25(n-1)$
arithmetic

b) Write an explicit rule to represent the amount of minutes spent resting, ***R*(*n*)**, after the *n*th exercise.
$R(n) = 0.25(2)^{n-1}$
geometric

4. Write the first four terms of the recursive sequence defined by the function below.

$f(n) = 8 - \frac{1}{2}f(n-1)$ and $f(1) = 16$

$\boxed{16, 0, 8, 4}$

$f(2) = 8 - \frac{1}{2}(16)$
$= 0$

$f(3) = 8 - \frac{1}{2}(0)$
$= 8$

$f(4) = 8 - \frac{1}{2}(8)$
$= 4$

Station #3

1. a) $V(t) = 132876(1-.03)^t$
   $V(t) = 132876(0.97)^t$

b) decay rate = .03 or 3%   decay factor = .97

c) 2017-2012 = 5 years $V(5) = 132876(0.97)^5$
   $= 114105.1424$
   About 114,105 people

d)

t	V(t)
18	76796
19	74492

2012 + 19 → 2031
In 2031, visitors will drop below 75,000.

2. a) linear   +350 every two weeks
   b) exponential   x 4
   c) exponential   x 1.07

3. $y = 7(1.2)^x$ $y = 5(4)^x$
   $y = 5(4)^x$ is growing faster because the common ratio is 4 which is greater than 1.2.

4. a) $(-1, \frac{1}{8})$
   $(4, 4)$

$$\frac{\Delta y}{\Delta x} = \frac{4-\frac{1}{8}}{4-(-1)} = \frac{3.875}{5} = \boxed{.775}$$

b) $y = ab^x$
   $a = \frac{1}{4}$ (y-intercept)
   $b = 2$ (common ratio)
   $\left(\frac{1}{4} \div \frac{1}{8}\right)$

$$\boxed{y = \frac{1}{4}(2)^x}$$

STATION #4 – *Factoring Polynomial Expressions*

1. Factor each polynomial expressions completely.

a) $3x^4 - 21x^3 + 30x^2$

GCF: $3x^2(x^2 - 7x + 10)$

AM: $\boxed{3x^2(x-5)(x-2)}$

b) $x^4 - 13x^2 - 14$

AM: $\boxed{(x^2-14)(x^2+1)}$

c) $2x^8 - 32$

GCF: $2(x^8-16)$

DOTS: $2(x^4-4)(x^4+4)$

DOTS: $\boxed{2(x^2-2)(x^2+2)(x^4+4)}$

2. Which expressions are *not* equivalent to $\mathbf{4x^2 - 12x - 40}$? → $4(x^2-3x-10)$
$4(x-5)(x+2)$

A. $(x-5)(x+2)$ No
$x^2-3x-10$

B. $4(x^2-3x-10)$ yes
$4x^2-12x-40$

C. $4x(x-12-40)$ No
$4x^2-48x-160x$

D. $2(2x-10)(x+2)$ yes
$(4x-20)(x+2)$
$4x^2-12x-40$

E. $(x-5)(4x+8)$ yes
$4x^2-12x-40$

F. $4(x^2-2x-5)$ No
$4x^2-8x-20$

3. If $x^2 + 2x + k = (x+5)(x+p)$, then: $5 \cdot p = k$

(1) p = 3 and k = -5
$5(3) = 15$

(2) p = -5 and k = -3
$5(-5) = -25$

(3) p = -3 and k = 15
$5(-3) = -15$

(4) p = -3 and k = -15
$5(-3) = -15$

4. The factors of $a^2 + b^2$ are:

(1) $(a+b)(a-b)$

(2) $a(a+b)$

(3) $(a+b)(a+b)$

(4) *The expression cannot be factored*

NOT A "DIFFERENCE" FOR DOTS
and NO GCF OTHER THAN 1.

5. Annie represented $p^4 - 1$ in factored form as $(p+1)(p-1)(p+1)(p-1)$.
Do you agree or disagree with Annie? Explain your reasoning.

$p^4 - 1$

DOTS: $(p^2-1)(p^2+1)$

DOTS: $(p+1)(p-1)(p^2+1)$

Disagree because p^2+1 is not factorable (not DOTS).