Question 37 continued

State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer.

$X = 3$

It is where the 2 lines intersect.

If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

They should choose A(x) b/c the cost would be cheaper than B(x).

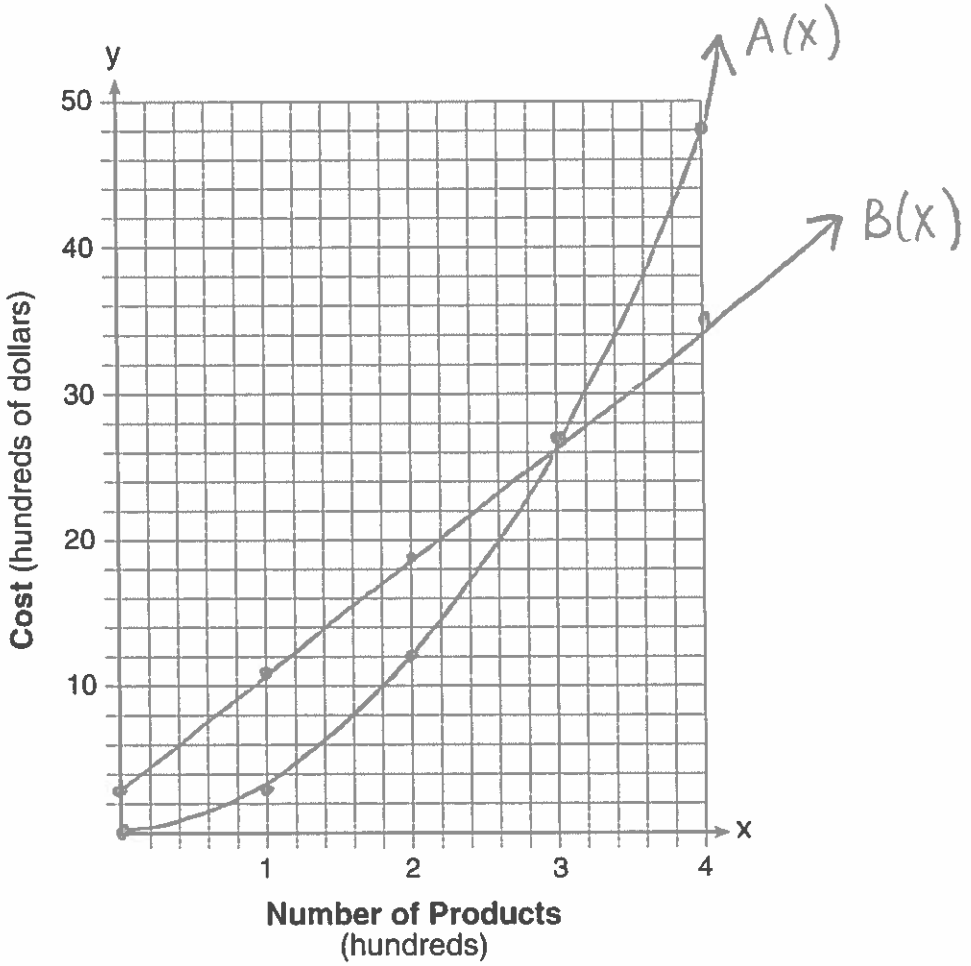
$1200 < 1900$

Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. A correct numerical answer with no work shown will receive only 1 credit. The answer should be written in pen. [6]

37 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*.

Graph the production cost functions on the set of axes below and label them site A and site B.



Question 37 is continued on the next page.

36 An animal shelter spends \$2.35 per day to care for each cat and \$5.50 per day to care for each dog. Pat noticed that the shelter spent \$89.50 caring for cats and dogs on Wednesday.

Write an equation to represent the possible numbers of cats and dogs that could have been at the shelter on Wednesday.

$2.35c + 5.50d = 89.50$

Pat said that there might have been 8 cats and 14 dogs at the shelter on Wednesday. Are Pat's numbers possible? Use your equation to justify your answer.

$2.35(8) + 5.50(14) = 89.50$

$95.80 \neq 89.50$

No Pat's numbers are incorrect.

Later, Pat found a record showing that there were a total of 22 cats and dogs at the shelter on Wednesday. How many cats were at the shelter on Wednesday?

$2.35c + 5.50d = 89.50$

$-2.35(c + d = 22)$

$2.35c + 5.50d = 89.50$

$-2.35c - 2.35d = -51.70$

$c + d = 22$

$c + 12 = 22$

$\boxed{c = 10}$

$\frac{3.15d}{3.15} = \frac{37.8}{3.15}$

$d = 12$

35 Caitlin has a movie rental card worth \$175. After she rents the first movie, the card's value is \$172.25. After she rents the second movie, its value is \$169.50. After she rents the third movie, the card is worth \$166.75.

Assuming the pattern continues, write an equation to define $A(n)$, the amount of money on the rental card after n rentals.

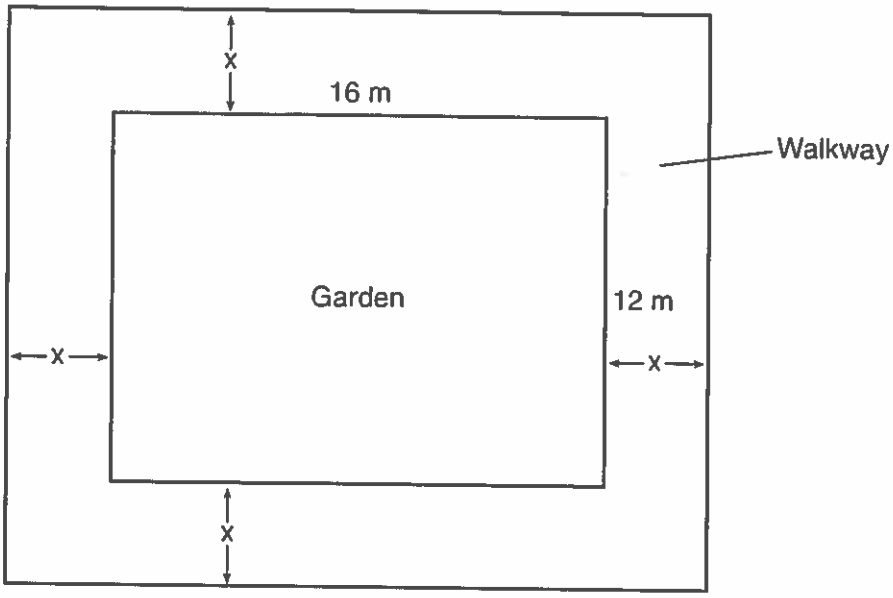
$A(n) = 175 - 2.75n$

Caitlin rents a movie every Friday night. How many weeks in a row can she afford to rent a movie, using her rental card only? Explain how you arrived at your answer.

$\frac{175}{2.75} = 63.\overline{63}$

63 weeks b/c she will have only \$1.75 left after 63 weeks which isn't enough for a movie (which costs \$2.75)

34 A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of x meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.



Write an equation that can be used to find x, the width of the walkway.

$(12+2x)(16+2x)=396$

Describe how your equation models the situation.

I added 2x to each side of the garden to represent the "x" width of the walkway.

Determine and state the width of the walkway, in meters.

$(12+2x)(16+2x)=396$

$192+56x+4x^2=396$

$-396 \qquad -396$

$4x^2+56x-204=0$

$\frac{4(x^2+14x-51)}{4}=\frac{0}{4}$

$x^2+14x-51=0$

$(x+17)(x-3)=0$

$x=-17$ reject | $x=3$

Part III

Answer all 4 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

33 Write an equation that defines $m(x)$ as a trinomial where $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$.

$m(x) = -3x^2 + 10x - 3 + 4x^2 + 19$

$m(x) = x^2 + 10x + 16$

	$3x$	-1
3	$9x$	-3
$-x$	$-3x^2$	x

Solve for x when $m(x) = 0$.

$0 = x^2 + 10x + 16$

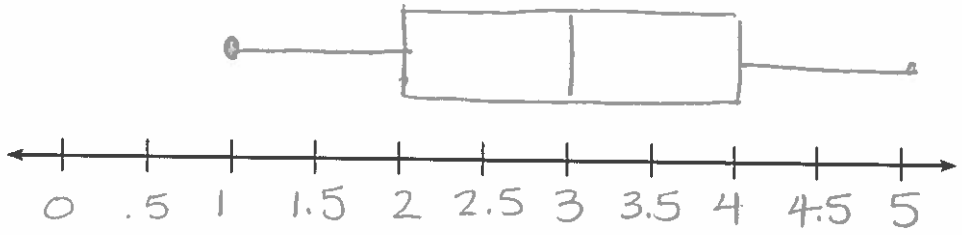
$(x + 8)(x + 2) = 0$

$x = -8$	$x = -2$

32 Robin collected data on the number of hours she watched television on Sunday through Thursday nights for a period of 3 weeks. The data are shown in the table below.

	Sun	Mon	Tues	Wed	Thurs
Week 1	4	3	3.5	2	2
Week 2	4.5	5	2.5	3	1.5
Week 3	4	3	1	1.5	2.5

Using an appropriate scale on the number line below, construct a box plot for the 15 values.

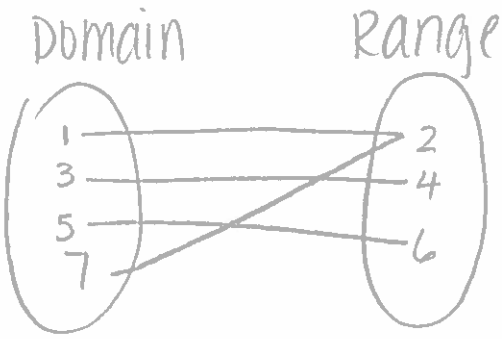


min = 1
Q_1 = 2
Med = 3
Q_3 = 4
Max = 5

30 The function f has a domain of {1, 3, 5, 7} and a range of {2, 4, 6}.

Could f be represented by {(1,2), (3,4), (5,6), (7,2)}?

Justify your answer.



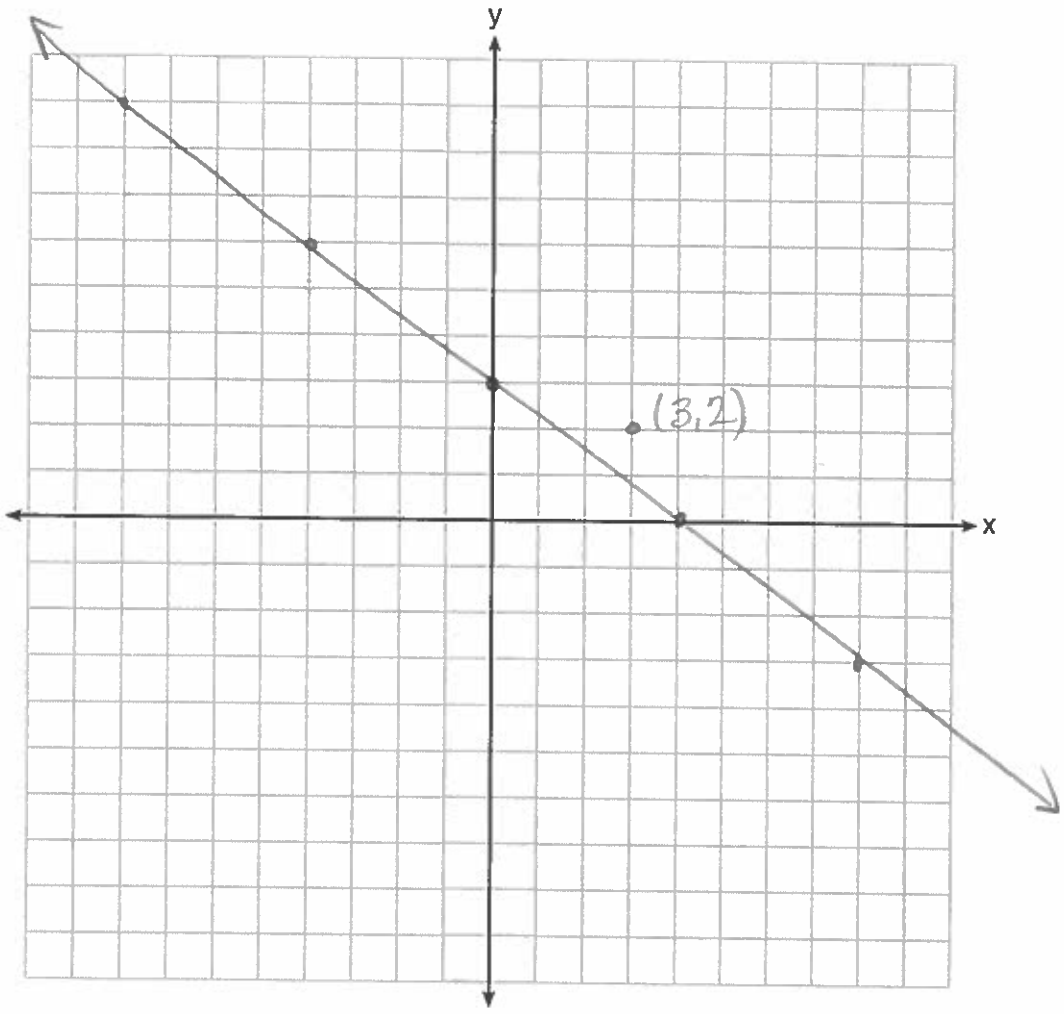
yes this could be a function b/c each x is paired with one y. and all values are in the domain + range.

31 Factor the expression $x^4 + 6x^2 - 7$ completely.

$(x^2 + 7)(x^2 - 1)$

$(x^2+7)(x+1)(x-1)$

29 On the set of axes below, draw the graph of the equation $y = -\frac{3}{4}x + 3$.



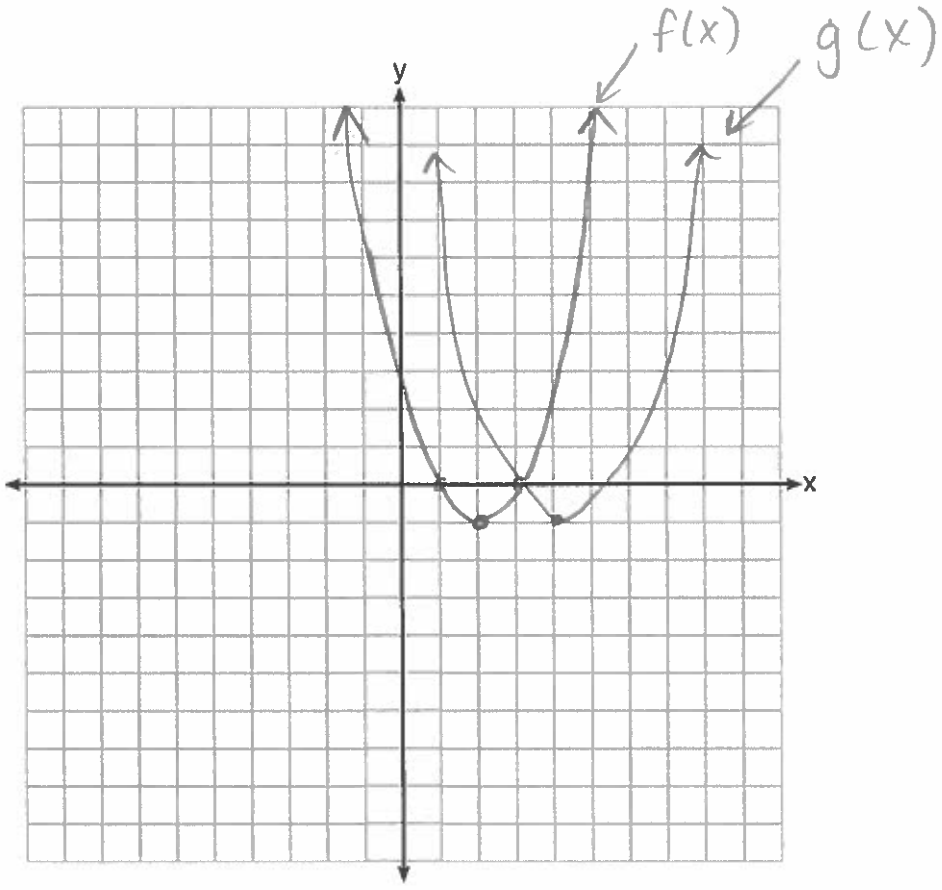
Is the point (3,2) a solution to the equation? Explain your answer based on the graph drawn.

(3,2) is not a solution b/c it is not on the line $y = -\frac{3}{4}x + 3$.

28 The vertex of the parabola represented by $f(x) = x^2 - 4x + 3$ has coordinates $(2,-1)$. Find the coordinates of the vertex of the parabola defined by $g(x) = f(x - 2)$. Explain how you arrived at your answer.

[The use of the set of axes below is optional.]

vertex of g(x) is (4,-1)
b/c g(x) is f(x) shifted
to the right 2 units.



26 The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.5)^t$, where $p(t)$ represents the number of milligrams of the substance and t represents the time, in years. In the function $p(t)$, explain what 0.5 and 300 represent.

0.5 → represents the decay factor.

300 → represents the initial amount of milligrams of the chemical.

27 Given $2x + ax - 7 > -12$, determine the largest integer value of a when $x = -1$.

$2(-1) + a(-1) - 7 > -12$

$-2 + -1a - 7 > -12$

$-9 - 1a > -12$

$+9 \quad +9$

$\frac{-1a}{-1} > \frac{-3}{-1}$

$a < 3$

largest integer is 2

KEY

Part II

Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

25 Draw the graph of $y = \sqrt{x} - 1$ on the set of axes below.