1. \( f(x) = 3x - x^2 \) find \( f(x + 2) - f(4) \)
   \[ f(x+2) = 3(x+2) - (x+2)^2 = 3x + 6 - (x^2 + 4x + 4) \]
   \[ = -x^2 - x + 2 \]
   \[ f(4) = 3(4)(4)^2 = 12 - 16 = -4 \]

2. \( y = -x^2 + 6x - 2 \), \( x < 4 \). Find range (no graphers).

3. \( y = -3x + b \) \( x > 0 \), \( b > 0 \) Find range (no graphers).
1. Solve the system, show work algebraically.
   \[
   \begin{align*}
   3x + 5y &= -1 \\
   -2x + 2y &= -10
   \end{align*}
   \]

2. Find \( m \) and \( c \) so that the system:
   \[
   \begin{align*}
   3x - 4y &= -10 \\
   9x + my &= c
   \end{align*}
   \]
   has
   a) no solution
   b) infinite solutions
3. Solve, show work algebraically.
   a) \( x + 3 = \frac{28}{x} \)
   b) \( x(x + 8) = -7 \)

\[
x^2 + 8x = -7
\]
\[
x^2 + 8x + 7 = 0
\]
\[
(x + 7)(x - 1) = 0
\]

\( x = -7 \) \( x = -1 \)

3a) \( \) 

b) \( \)

4. Find \( k \) for which \( 2x^2 + kx + 2 = 0 \) has
   a) one real solution
   b) 2 real solutions
   c) no real solution

4a) \( \) 

b) \( \) 

c) \( \)
5. Put in turning point form and hence find the vertex.

   \[ y = 3x^2 + 12x + 17 \]

   \[ \text{vertex: } \]

6. Find the equation of the parabola with x-intercepts at -4 and 3 and y-intercept at -6.

7. Solve. Express answer in interval notation.

   \[ 2x^2 + x - 1 < 0 \]
8. Graph the functions on the same set of axes, then solve: $f(x) < g(x)$.

$f(x) = x - 5 \quad \text{and} \quad g(x) = x^2 - 6x + 5$

8. solution: 

9. Find $m$ so that the line is tangent to the parabola.

$y = 2x + m$
$y = x^2 + 3x - 5$
Translations and Vector Notation:

Horizontal translations \( g(x) = f(x - a) \)

Example: \( g(x) = (x+3)^2 \)

The parent graph \( f(x) = x^2 \), with a horizontal translation, to the left 3. We have added 3 to all of the x coordinates, giving the appearance that the graph has moved 3 LEFT.

Vector Notation for this translation:

\( (-3) \) (x direction)

\( (0) \) (3 left)
Vertical Translation \( g(x) = f(x) + b \)

Ex: \( g(x) = x^2 + 3 \) is the parent graph \( f(x) = x^2 \), with a vertical translation. We have added 3 to all of the outcomes which makes it look like the graph has been shifted **UP 3**.

**Vector Notation for this translation:**

\[
\begin{pmatrix} 0 \\ 3 \end{pmatrix} \rightarrow y \text{ direction up 3}
\]
Given the graph of $f(x)$, sketch the graph of $f(x-2)+1$

Vector Notation for this translation: $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$
Find an equation of the relation under the translation vector, and graph the original equation and the translated one.

1. $x^2 + y^2 = 25$ ; \( \begin{pmatrix} 3 \\ 2 \end{pmatrix} \)

2. $xy = 4$ ; \( \begin{pmatrix} -2 \\ 1 \end{pmatrix} \)
3. \[ y = \sqrt{x - 3} \quad ; \quad \begin{pmatrix} 4 \\ -2 \end{pmatrix} \]

\[ f(x) = \sqrt{x} \]
Express, in terms of \( f(x) \), the transformation required to map \( f(x) \) to \( g(x) \)

\[
f(x) = x^2, \quad g(x) = x^2 - 6x + 13
\]

\[
\begin{align*}
(x^2 - bx + q) &= -13 + 9 \\
(x - 3)^2 &= -4 \\
g(x) &= (x - 3)^2 + 4 \\
\text{Vertex} \quad &3, 4
\end{align*}
\]

\[
\begin{align*}
\left(\frac{3}{4}\right), \quad f(x) \to f(x - 3) + 4
\end{align*}
\]
"An A student does a problem and checks the back
A B student does all the problems than checks the back
A C student checks the back the day before the homework quiz
A D student never checks the back
An F student doesn't do the homework"

~ Baker
HW: SL Book

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