1. Graph \( y = -x^2 + 7 \). Find domain, range and express answers in the interval notation.

2. Graph \( f(x) = |x+5| \). Find domain, range and express answers in the interval notation.

3. Graph \( f(x) = -2 \sqrt{4-x} \). Find domain, range, and express answers in the interval notation.
4 Use transformations to graph $f(x) = -2(x+4)^2 - 3$. Show all intermediate graphs. Find the intervals on the $x$-axis on which $f$ is increasing/decreasing.

5 Find the domain and range of $6 - x^2 = (y-3)^2$. Provide the exact answers in the interval notation.
(a) The graph of some function \( y = f(x) \) is given below. On the same set of axes, draw the graph of \( y = -f(x) \).

\[
\begin{align*}
\text{Given } f(x) = 2x + 3 \quad \text{and} \quad g(x) = 2x^2 - 4x + 3, & \quad \text{find} \\
\quad \text{(a) } (f \circ g)(1) & \quad \text{(b) } (g \circ f)(x). \quad \text{Simplify completely.}
\end{align*}
\]

(b) The graph of some function \( y = f(x) \) is given below. On the same set of axes, draw the graph of \( y = \frac{1}{2} \cdot f(x) \).

\[
\begin{align*}
\quad \text{Given } f(x) = \frac{1 - 2x}{3x + 1} \quad \text{and} \quad g(x) = \frac{5x + 2}{1 - 4x}, & \quad \text{find } (f \circ g)(x). \quad \text{Simplify.}
\end{align*}
\]

Find the equation of the line passing through the points \((3, -7)\) and \((-5, 6)\). Provide the exact answer in the slope-intercept form.
Find the equation of the line passing through the points \((3, -7)\) and \((-5, 6)\). Provide the exact answer in the slope-int. form.

Find the equation of the line passing through the point \((-2, 8)\) and which is perpendicular to the line \(4x = -7 - 5y\). Leave your answer in the standard form with integral coefficients.
1. Graph $y = -x^2 + 7$. Find domain, range and express answers in the interval notation.

   Domain = $(-\infty, \infty)$
   Range = $(-\infty, 7]$  

2. Graph $f(x) = |x+5|$. Find domain, range and express answers in the interval notation.

   Domain = $(-\infty, \infty)$
   Range = $[0, \infty)$

3. Graph $f(x) = -2\sqrt{4-x}$. Find domain, range, and express answers in the interval notation.

   Domain = $(-\infty, 4]$
   Range = $(-\infty, 0]$  

4. Use transformations to graph $f(x) = -2(x+4)^2 - 3$. Show all intermediate graphs. Find the intervals on the x-axis on which $f$ is increasing/decreasing.

   Build the equation

   I. $y = x^2$
   II. $y = (x+4)^2$
   III. $y = 2(x+4)^2$
   IV. $y = -2(x+4)^2$
   V. $y = -2(x+4)^2 - 3$

   $f$ is increasing on $(-\infty, -4]$
   $f$ is decreasing on $[-4, \infty)$
Use transformations to graph $f(x) = -2(x+4)^2 - 3$. Show all intermediate graphs. Find the intervals on the x-axis on which $f$ is increasing/decreasing.

Build the equation

I. $y = x^2$

II. $y = (x+4)^2$

III. $y = 2(x+4)^2$

IV. $y = -2(x+4)^2$

V. $y = -2(x+4)^2 - 3$

$f$ is increasing on $(-\infty, -4]$.

$f$ is decreasing on $[-4, \infty)$.

Find the domain and range of $6 - x^2 = (y-3)^2$. Provide the exact answers in the interval notation.

$x^2 + (y-3)^2 = 6$

$(x-0)^2 + (y-3)^2 = 6$

This represents the equation of a circle.

Center = $(0, 3)$

Radius = $\sqrt{6}$

$(-\sqrt{6}, 3), (0, 3+\sqrt{6}), (0, 3-\sqrt{6}), (\sqrt{6}, 3), (3-\sqrt{6}, 3), (3+\sqrt{6}, 3)$

$\therefore$ Domain = $[-\sqrt{6}, \sqrt{6}]$

Range = $[3-\sqrt{6}, 3+\sqrt{6}]$. 
MATH 161 (SMR 03)  

(a) The graph of some function \( y = f(ax) \) is given below. On the same set of axes, draw the graph of \( y = -f(x) \).

![Graph of \( y = f(x) \) and \( y = -f(x) \)]

(b) The graph of some function \( y = f(x) \) is given below. On the same set of axes, draw the graph of \( y = \frac{1}{2} f(x) \).

![Graph of \( y = f(x) \) and \( y = \frac{1}{2} f(x) \)]

7. Given \( f(x) = 2x + 3 \) and \( g(x) = 2x^2 - 4x + 3 \), find

(a) \( (f \cdot g)(1) \)

\[
(f \cdot g)(1) = f(1) \cdot g(1)
\]

\[
= (2(1) + 3) \cdot [2(1)^2 - 4(1) + 3]
\]

\[
= 5 \cdot (1)
\]

\[
= 5
\]

\[
\therefore (f \cdot g)(1) = 5
\]

(b) \( (g \circ f)(x) \), simplify completely.

\[
(g \circ f)(x) = g(f(x))
\]

\[
= 2(2x + 3)^2 - 4(2x + 3) + 3
\]

\[
= 2(4x^2 + 12x + 9) - 8x - 12 + 3
\]

\[
= 8x^2 + 24x + 18 - 8x - 9
\]

\[
\therefore (g \circ f)(x) = 8x^2 + 16x + 9
\]

8. Given \( f(x) = \frac{1 - 2x}{3x + 1} \) and \( g(x) = \frac{5x + 2}{1 - 4x} \), find \( (f \circ g)(x) \), simplify.

\[
(f \circ g)(x) = f(g(x)) = \left[ 1 - \frac{2(5x + 2)}{1 - 4x} \right] \frac{1 - 4x}{(1 - 4x)}
\]

\[
= \frac{1 - 4x - 10x - 8}{15x + 6 + 1 - 4x}
\]

\[
= \frac{-14x - 3}{11x + 7}
\]

\[
\therefore (f \circ g)(x) = \frac{-14x - 3}{11x + 7}
\]

9. Find the equation of the line passing through the points \((3, -7)\) and \((-5, 6)\). Provide the exact answer in the slope-intercept form.

\[
\text{Slope } m = \frac{y_2 - y_1}{x_2 - x_1}
\]

\[
m = \frac{6 + 7}{-5 - 3}
\]

\[
m = \frac{13}{-8}
\]

\[
y + 7 = \frac{-13}{8} (x - 3)
\]

\[
y = \frac{-13}{8} x - \frac{17}{8}
\]
9. Find the equation of the line passing through the points \((3, -7)\) and \((-5, 6)\). Provide the exact answer in the slope-int. form.

\[ \text{Slope} = m = \frac{y_2 - y_1}{x_2 - x_1} \]

\[ m = \frac{6 + 7}{-5 - 3} = \frac{-13}{8} \]

Use point-slope formula

\[ y - y_1 = m(x - x_1) \]

\[ y + 7 = \frac{-13}{8}(x - 3) \]

\[ y = \frac{-13x}{8} - \frac{17}{8} \]

10. Find the equation of the line passing through the point \((-2, 8)\) and which is perpendicular to the line \(4x = -7 - 5y\). Leave your answer in the standard form with integral coefficients.

I. Slope of given line

\[ 4x = -7 - 5y \]

II. Slope of \(1^{st}\) line

\[ m = \frac{-1}{(-\frac{4}{5})} = \frac{5}{4} \]

III. Eqn. of \(1^{st}\) line

\[ y - 8 = \frac{5}{4}(x + 2) \]

\[ 4y - 32 = 5x + 10 \]

\[ -42 = 5x - 4y \]

\[ 5x - 4y = -42 \]