7. Determine the inverse equation for the following functions. See next page.
   a) \( y = 5x - 6 \)
   b) \( f(x) = (x + 4)^2 - 1 \)
   c) \( f(x) = 9x^2 + 1 \)

8. For \( f(x) = \sqrt{x - 3} \), write the equations for each of the following, do NOT simplify.
   a) \(-f(x) = \sqrt{x - 3} \)
   b) \( f(-x) = \sqrt{3 - x} \)
   c) \( f(x + 7) = \sqrt{x + 7 - 3} \)
   d) \( 8f(x) = 8\sqrt{x - 3} \)

9. Describe how each of the functions below can be obtained from the graph of \( f(x) \).
   a) \( y = f(x + 3) - 7 \)
   b) \( y = 3f(-x) \)
   c) \( y = -f(\frac{1}{3}x) - 4 \)
   d) \( y = f(x) \), reflect in \( x \)-axis

10. Given \( f(x) \) in the first graph below, give expressions in function notation for the remaining graphs.
   a) \( y = f(x - 5) + 4 \)
   b) \( y = -\frac{1}{2}f(x) \)
   c) \( y = f\left(\frac{3}{2}x\right) + 2 \)
   d) \( y = 3f(x) \)
   e) \( y = f\left(\frac{3}{2}x\right) - 2 \)
   f) \( y = -f(-x) \)
1. For each of the following graphs, state whether it represents a function, then give its domain and range.

Function? (yes / no) | Domain: | Range: |
--- | --- | --- |
Function? (yes / no) | Domain: | Range: |
Function? (yes / no) | Domain: | Range: |
Function? (yes / no) | Domain: | Range: |

2. If \( f(x) = 3x - 2 \), determine, simplifying your answers where possible:
   a) \( f(3) \)  
   b) \( f(-2) \)  
   c) \( f(2k) \)  
   d) \( f(4x - 1) \)

3. If \( f(x) = 2x^2 + 3x - 4 \), determine, simplifying your answers where possible:
   a) \( f(3) \)  
   b) \( f(-2) \)  
   c) \( f(3a - 2) \)

4. If \( f(x) = \frac{2}{x + 3} \), determine, without simplifying answers:
   a) \( f(4x) \)  
   b) \( 4f(x) \)  
   c) \( f(a + b) + c \)

5. Sketch each of the indicated functions on the grids provided.

a) \( y = f(x) \)  
   b) \( y = f(x - 2) \)  
   c) \( y = f(x) + 3 \)  
   d) \( y = f(2x) \)  
   e) \( y = \frac{1}{2}f(x) \)  
   f) \( y = -f(x) \)
6. Sketch each of the indicated functions on the grids provided.

- **g)** \( y = f(-x) \) reflected in \( y \)-axis
- **h)** \( y = f(x+3)-2 \)
- **i)** \( y = -2f(\frac{1}{4}x) \) reflected in \( x \)-axis
- **j)** \( y = f(-(x+3))+1 \) reflected in \( y \)-axis
- **k)** \( y = 2f(2(x-5))-4 \)
- **l)** \( y = f^{-1}(x) \)

- **a)** \( y = 2x^2 - 4 \)
- **b)** \( y = \frac{2}{x} \)
- **c)** \( y = -\sqrt{x} + 4 \)
- **d)** \( y = -\left(\frac{1}{2}x\right)^2 + 3 \)
- **e)** \( y = 3\sqrt{x} + 3 - 2 \)
- **f)** \( y = -\frac{1}{x-3} + 2 \) reflected in \( x \)-axis

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**Note:** The solutions are presented in the form of graphs and transformations of functions.
# 7. a) \( y = 5x - 6 \)

For \( f'(x) \),

\[
5y - 6 = x \\
5y = x + 6 \\
y = \frac{x + 6}{5}
\]

\[ \therefore f'(x) = \frac{1}{5}x + \frac{6}{5} \]

-sloped line is a function

\[ m = \frac{1}{5}, b = \frac{6}{5} \]

\[ D: \{x \in \mathbb{R}\} \]

\[ R: \{y \in \mathbb{R}\} \]

b) \( f(x) = (x+4)^2 - 1 \)

For \( f^{-1}(x) \),

\[
(y+4)^2 - 1 = x \\
(y+4)^2 = x + 1 \\
(y+4) = \pm \sqrt{x+1}
\]

\[ \therefore f^{-1}(x) = \pm \sqrt{x+1} - 4 \]

-not a function (parabola on side)

\[ D: \{x \in \mathbb{R}\} \]

\[ R: \{y \geq -13\} \]

c) \( f(x) = 9x^2 + 1 \)

For \( f^{-1}(x) \),

\[
y^2 + 1 = x \\
y^2 = x - 1 \\
y = \pm \sqrt{x-1}
\]

\[
y = \pm \sqrt{\frac{x-1}{9}} \\
y = \pm \sqrt{\frac{x-1}{3}}
\]

\[ D: \{x \geq 1\} \]

\[ R: \{y \in \mathbb{R}\} \]

\[ \therefore \frac{1}{3}\sqrt{x-1} = y \]

\[ -\frac{1}{3}\sqrt{x-1} = y \]