Directions: Please answer the following questions and make sure your answer are legible. You must show your work to receive credit for your answers. You may not use a calculator (or any other technology) on this quiz. Good Luck.

1. (3 points) Does the equation $x^3 + y^3 = 4$ represent $y$ as a function of $x$? Justify Your Answer (1.3 # 44)

$$x^3 + y^3 = 4$$
$$y^3 = 4 - x^3$$
$$y = \sqrt[3]{4 - x^3}$$

Yes, $y$ is a function of $x$.

2. (3 points) Does the equation $x^2 - y^2 = 4$ represent $y$ as a function of $x$? Justify Your Answer (1.3 # 43)

$$x^2 - y^2 = 4$$
$$x^2 - 4 = y^2$$
$$\sqrt{x^2 - 4} = |y|$$

No, $y$ is not a function of $x$.

3. (4 points)

24.

(a) Determine whether or not the relation represents $y$ as a function of $x$.

(b) Find the domain and range if this relation is a function. Write you answer in interval notation.

$$\text{Domain: } (-4, -1) \cup (0, 4]$$

Yes, $y$ is a function.

$$\text{Range: } [-5, -1] \cup [0, 4]$$

See above.
4. (4 points) Let $f(x) = \frac{x}{x-1}$. Find and simplify the following: (1.4 # 15)

(a) $f(x-4)$

(b) $f(x) - 4$

\[
\begin{align*}
\text{a) } f(x-4) &= \frac{x-4}{(x-4)-1} = \frac{x-4}{x-5} \\
\text{b) } f(x) - 4 &= \frac{x}{x-1} - 4 = \frac{x}{x-1} - \frac{4(x-1)}{x-1} \\
&= \frac{x - 4x + 4}{x-1} = \frac{-3x + 4}{x-1}
\end{align*}
\]

5. (5 points)

(a) For $f(x) = \frac{2}{x}$, find and simplify $f\left(\frac{a}{b}\right)$ (1.4 # 26)

(b) For $f(x) = x^2 - 3x + 2$, find and simplify $f(x^2)$ (1.4 # 14)

\[
\begin{align*}
\text{a) } f\left(\frac{a}{b}\right) &= \frac{2}{\frac{a}{b}} = \frac{2b}{a} \\
\text{b) } f(x^2) &= (x^2)^2 - 3(x^2) + 2 \\
&= x^4 - 3x^2 + 2
\end{align*}
\]

6. (6 points) Find the domain of the following functions. Write your answer in interval notation (1.4 # 39)

(a) $f(x) = \frac{x-2}{x+1}$

(b) $f(x) = \sqrt{6x-2}$ (1.4 # 49)

\[
\begin{align*}
\text{a) } &\text{Domain } (-\infty, 1) \cup (1, \infty) \\
\text{b) } &\text{Domain } \left[\frac{5}{3}, \infty\right) \cup (1, \infty)
\end{align*}
\]