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. (4 points) \( f(x) = \begin{cases} 1 + x & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases} \) (# 35 in 3.4)
   (a) Sketch the graph of \( f(x) \).
   (b) Find the domain of \( f(x) \) (give your answer in interval notation)
   (c) Find the range of \( f(x) \) (give your answer in interval notation)
   (d) Give the coordinates of all intercepts.
   ![Graph of f(x)](image)

2. (4 points) For \( h(x) = \frac{4}{x} + 2 \) (# 56 in 3.4)
   (a) Sketch the graph of \( h(x) \) using the techniques of shifts, compressions, stretches and/or reflections. Show your work.
   (b) State the domain and range of \( h(x) \).
   ![Graph of h(x)](image)
3. (2 points) For \( f(x) = \frac{1}{4}x - 3 \)

(a) What are the slope and \( y \)-intercept of \( f(x) \)?

(b) Is the function increasing, decreasing or constant?

\[
\text{a) } m = \frac{1}{4} \\
\text{y-int} = -3 \quad (0, -3)
\]

\[
\text{b) increasing} \quad (m = x)
\]

4. (5 points) For \( f(x) = -2x^2 + 2x - 3 \)

(a) Write \( f(x) \) in \( f(x) = a(x - h)^2 + k \) format.

(b) Find the coordinates of the intercepts.

(c) Sketch the graph of \( f(x) \) (using any correct method).

(d) Find the interval(s) where \( f(x) \) is increasing and the interval(s) where \( f(x) \) is decreasing.

\[
f(x) = -2(x^2 - x) - 3
\]

\[
f(x) = -2(x^2 - x + \frac{1}{4} - \frac{1}{4}) - \frac{1}{4} - 2 \quad -3
\]

\[
f(x) = -2(x - \frac{1}{2})^2 - 2.5
\]

\[
\text{y-int } f(0) = 0 + 0 - 3 \quad (0, -3)
\]

\[
\text{No real solutions, so no x-intercepts}
\]

\[
\text{inc } (-\infty, \frac{1}{2}) \quad \text{dec } \left(\frac{1}{2}, \infty\right)
\]