WRITTEN ASSIGNMENT 1

Hand in full solutions to the questions below. Make sure you justify all your work and include complete arguments and explanations. Your answers must be clear and neatly written, as well as legible (no tiny drawings or micro-handwriting please!). Your answers must be stapled, with your name and student number at the top of each page.

1. (You may use a calculator for this question). Sketch the graph of \( y = x^2 + x - 2 \). What is the slope of the line through \((-1, -2)\) and \((x, y)\) for \( y = x^2 + x - 2 \) and \( x = -0.98\)? What is the slope of that line if \( x = -1.03\)? What is the slope of that line if \( x = -1 + h\)? Explain in your own words what happens to this slope when \( h \) is very small (close to zero)? Provide a sketch to support your argument (your diagram does not have to be in scale).

2. Sketch the graph of the following functions. Make sure you label your axes, the origin, the intercepts, etc.

(a) \( g(t) = \begin{cases} 1 & \text{if } t \leq 0 \\ t + 1 & \text{if } 0 < t < 2 \\ t^2 - 1 & \text{if } t \geq 2 \end{cases} \)

(b) \( f(x) = x + 3|x| \).

(c) On the diagram you drew in part (a), also draw a rough sketch of the tangent line to the curve \( y = g(t) \) at \( t = 3 \). Make an estimate of the slope of such line.

3. If \( f(x) = 3x^2 - x + 2 \), find \( f(2) \), \( f(a^2) \), \( [f(a)]^2 \), \( f(a + 1) \), \( \frac{f(x + h) - f(x)}{h} \).

4. Answer questions (a) to (e) of Problem #6 in Section 1.0, page 6, of the textbook. Include a copy of the plot with your work, a hand drawn diagram is fine, but make sure your plot has the correct features. Your solutions and explanations should be consistent with your plot.

5. Find the domain and sketch the graph of a function \( f(x) \) that satisfies all of the following conditions:
   (a) \( f(0) = 1/2 \) and \( f(1) = 2 \),
   (b) its inverse \( f^{-1} \) has domain \( x \geq 1/2 \).