(a) Suppose that you are given the graph of the function \( y = f(x) \), and you want to find the slope of the tangent line to the graph at the point \((a, f(a))\). Explain how to guess this slope by finding the slopes of secant lines.

(b) Given the slope of the tangent line to the graph of \( y = f(x) \) at the point \((a, f(a))\), explain how to find the equation of this line.

(c) By finding the slopes of appropriate secant lines, determine the equation of the tangent line to \( y = x^2 \) at \((1, 1)\).

(d) By finding the slopes of appropriate secant lines, determine the equation of the tangent line to \( y = -x \) at \((4, -4)\).

(e) By finding the slopes of appropriate secant lines, determine the equation of the tangent line to \( y = x^3 - 3 \) at \((1, -2)\).

(f) Stewart, Ch. 2.2, 1-4, 7, 9, 13.

(g) Stewart, Ch. 2.3, 11-30, 40, 42.

For this part only, the even problems are required and the odd problems are strongly recommended.

(h) Consider the following definition of a limit: ‘We say that \( \lim_{x \to a} f(x) = c \) if \( f(x) \) gets closer and closer to \( c \) as \( x \) gets closer and closer to \( a \).’

What is wrong with this definition?

(i) Give the definition of a limit, e.g., explain what it means to say that \( \lim_{x \to a} f(x) = c \). You may explain in words, or using the \( \epsilon - \delta \) formalism.

(j) Explain what it means for a function \( f(x) \) to be continuous. (The informal definition is okay.)

(k) Stewart, Ch. 2.5, 7-8.

(l) Graph the following functions. Which are continuous? For the functions that are not continuous, explain why.

\[ f(x) = x^2, \ f(x) = \sin(x), \ f(x) = \frac{1}{x^2}, \ f(x) = \frac{x-1}{x^2-1}, \ f(x) = e^x. \]