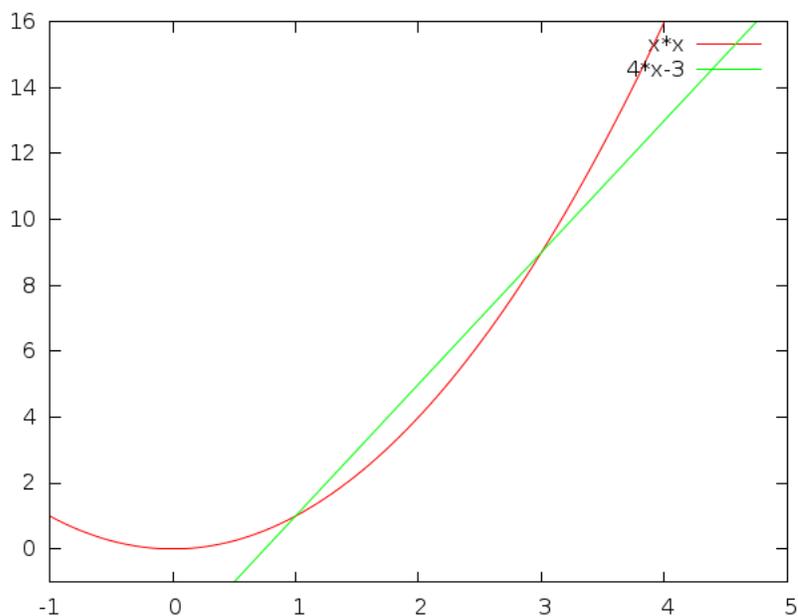# Math 100 – WORKSHEET 1
TANGENT AND VELOCITY PROBLEMS; LIMITS

1. THE SLOPE OF A GRAPH

(1) Find the slope of the line through $P(1,1)$ and $Q(x, x^2)$ where:

(a) $x = 3$

(b) $x = 1.1$

(c) $x = 1.01$

(d) $x = 1.001$

What is the slope of the tangent line at $P(1,1)$? What is its equation?

2. Limits

(1) Evaluate $f(x) = \frac{x-3}{x^2-x-6}$ at $x = 2.9$, 2.99, 2.999, 3.1,3.01, 3.001. What is $\lim_{x\to 3} f(x)$?

(2) Evaluate
  (a) $\lim_{x\to 1} \sin(\pi x)$

  (b) $\lim_{x\to 1} \frac{e^x(x-1)}{x^2+x-2}$.

  (c) $\lim_{x\to 0} \frac{\sqrt{1+2x}-\sqrt{1+x}}{3x}$

(3) Either evaluate the limit or explain why it does not exist. Sketching a graph might be helpful.
  (a) $\lim_{x\to 1} f(x)$ where $f(x) = \begin{cases} \sqrt{x} & 0 \le x < 1 \\ 1 & x = 1 \\ 2 - x^2 & x > 1 \end{cases}$.

  (b) $\lim_{x\to 1} f(x)$ where $f(x) = \begin{cases} \sqrt{x} & 0 \le x < 1 \\ 1 & x = 1 \\ 4 - x^2 & x > 1 \end{cases}$.