Math 21A
Kouba
Challenge Discussion Sheet 3

1.) Give an ϵ/δ-proof for each limit.

    a.) $\displaystyle\lim_{x \to -1} (x^2 - x) = 2$ b.) $\displaystyle\lim_{x \to 0} \frac{x+6}{2-x} = 3$ c.) $\displaystyle\lim_{x \to 4} (x + \sqrt{x}) = 6$

2.) Use $\displaystyle\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ to differentiate each function.

    a.) $f(x) = x^3 - x$

    b.) $f(x) = \dfrac{\sqrt{x}}{2 + \sqrt{x}}$

    c.) $f(x) = x + \sin(5x)$

3.) Find all points (x, y) on the graph of $y = x^2 + 3x$ with tangent lines passing through the point $(1, 0)$.

4.) Find an equation for each line tangent (simultaneously) to both of the graphs $y = x^2$ and $y = \dfrac{8}{x}$.

5.) A pyramid with a square base of area 16 square feet has height 5 feet. What is the radius of the largest sphere which can fit completley inside the outer surface of the pyramid?