1. (8 pts) Evaluate the limit, if it exists.

(a) $\displaystyle\lim_{x\to-3} \frac{x+2}{x+3}$

(b) $\displaystyle\lim_{x\to 2} \frac{1-x}{(x-2)^2}$

(c) $\displaystyle\lim_{x\to-\infty} \frac{(2x+1)^2}{2x(x-1)}$

(d) $\displaystyle\lim_{x\to\infty} \sqrt{x+1} - \sqrt{x}$

2. (1) (4pts) Write out the definition of $f'(x)$ in terms of limit.

(2) (6pts) Let $f(x) = x^2 + x + 1$. Use the definition of derivative to evaluate $f'(1)$.

(3) (2pts) Find an equation of the tangent line to graph of f at $(1, 3)$.

(4) (bonus: 2pts) Let $f(x) = \frac{1}{x}$. Use the definition of derivative to find $f'(x)$.