Quiz 1

1. Evaluate the following limits. If a limit does not exist, write DNE, ∞ or $-\infty$ based on your best estimate. You do NOT need to explain your answers.

   (a)
   $$\lim_{x\to 1}(x^3 - x^2 + 2)$$

   (b)
   $$\lim_{x\to 1}\frac{1}{x+1}$$

   (c)
   $$\lim_{x\to 0^-}\frac{1}{x(x+1)}$$

2. Evaluate the following limit (and show your work!)
   $$\lim_{h\to 0}\frac{\sqrt{1+h}-1}{h}$$

1. (a) (2pt) $\lim_{x\to 1}(x^3-x^2+2) = \lim_{x\to 1} x^3 - \lim_{x\to 1} x^2 + \lim_{x\to 1} 2$

$$= 1^3 - 1^2 + 2$$

$$= 2$$

(b) (2pt) $\lim_{x\to 1} \frac{1}{x+1} = \frac{1}{\lim_{x\to 1} x + 1} = \frac{1}{1+1} = \frac{1}{2}$

(c) (3pt) $\lim_{x\to 0^-} \frac{1}{x(x+1)} = -\infty$

because $x(x+1) < 0$ as x approaches 0 from the left and $x(x+1)$ is close to $0(0+1) = 0$.

2. (3pt) $\frac{\sqrt{1+h}-1}{h} = \frac{(\sqrt{1+h}-1)(\sqrt{1+h}+1)}{h(\sqrt{1+h}+1)} = \frac{(1+h)-1}{h(\sqrt{1+h}+1)}$

$$= \frac{h}{h(\sqrt{1+h}+1)}$$

$$= \frac{1}{\sqrt{1+h}+1}$$

$$\lim_{h\to 0} \frac{\sqrt{1+h}-1}{h} = \lim_{h\to 0} \frac{1}{\sqrt{1+h}+1} = \frac{1}{\sqrt{1+0}+1} = \frac{1}{2}$$