Quiz 1

1. Evaluate the following limits. If a limit does not exist, write DNE, $\infty$ 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) \[ \lim_{x \to 1} (x^3 - x^2 + 2) = \lim_{x \to 1} x^3 - \lim_{x \to 1} x^2 + \lim_{x \to 1} 2 = 1^3 - 1^2 + 2 = 2 \]

(b) \[ \lim_{x \to 1} \frac{1}{x+1} = \frac{1}{\lim_{x \to 1} x+1} = \frac{1}{1+1} = \frac{1}{2} \]

(c) \[ \lim_{x \to 0} \frac{1}{x(x+1)} = -\infty \]

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

2. \[ \lim_{h \to 0} \frac{\sqrt{1+h} - 1}{h} = \frac{(\sqrt{1+h} - 1)(\sqrt{1+h} + 1)}{h(\sqrt{1+h} + 1)} = \frac{(1+h) - 1}{h(\sqrt{1+h} + 1)} = \frac{h}{h(\sqrt{1+1} + 1)} = \frac{1}{\sqrt{1+1}} \]

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