

Quiz #3

1. Evaluate the limit, if it exists. If the limit does not exist, write ∞ , $-\infty$, or DNE.

$$\text{a. } \lim_{x \rightarrow 1} \frac{x^2 - 3x + 2}{4x - 2x^2} = \frac{1^2 - 3 + 2}{4 - 2} = \frac{0}{2} = 0 \quad [1.5]$$

$$\text{b. } \lim_{x \rightarrow 2} \frac{x^2 - 3x + 2}{4x - 2x^2} = \lim_{x \rightarrow 2} \frac{(x-2)(x-1)}{-2x(x-2)} = \lim_{x \rightarrow 2} \frac{x-1}{-2x} = \frac{1}{-4} \quad [2]$$

$$\text{c. } \lim_{x \rightarrow 0^-} \frac{x^2 - 3x + 2}{4x - 2x^2} = \lim_{x \rightarrow 0^-} \frac{x-1}{-2x} = \frac{-1}{\rightarrow 0^+} = -\infty \quad [2]$$

$$\begin{aligned} \text{d. } \lim_{t \rightarrow 0} \frac{\sqrt{t+4} - 2}{t} &= \frac{\sqrt{t+4} + 2}{\sqrt{t+4} + 2} = \lim_{t \rightarrow 0} \frac{(t+4) - 4}{t(\sqrt{t+4} + 2)} \\ &= \lim_{t \rightarrow 0} \frac{1}{\sqrt{t+4} + 2} = \frac{1}{4} \end{aligned} \quad [2]$$

$$\text{e. } \lim_{h \rightarrow 0} \frac{f(5+h) - f(5)}{h}, \text{ if } f(x) = x^2 - 3x. \quad [2.5]$$

$$\begin{aligned} &= \lim_{h \rightarrow 0} \frac{(5+h)^2 - 3(5+h) - (25 - 15)}{h} \\ &= \lim_{h \rightarrow 0} \frac{25 + 10h + h^2 - 15 - 3h - 25 + 15}{h} \\ &= \lim_{h \rightarrow 0} \frac{h(10 + h - 3)}{h} = \lim_{h \rightarrow 0} 7 + h = 7 \end{aligned}$$