

Name: _____

Section: _____

total pts: /10

1. (a) Explain why we cannot use the limit law for the limit of a quotient to write

$$\lim_{x \rightarrow 3} \frac{x^2 + x - 12}{x - 3} = \frac{\lim_{x \rightarrow 3} x^2 + x - 12}{\lim_{x \rightarrow 3} x - 3}.$$

- (b) Simplify the expression $\frac{x^2 + x - 12}{x - 3}$ so that it is easy to apply the limit laws and evaluate the limit

$$\lim_{x \rightarrow 3} \frac{x^2 + x - 12}{x - 3}.$$

2. Let f be defined by

$$f(x) = \begin{cases} x^2 + kx & \text{if } x \leq 2 \\ x - 4 & \text{if } x > 2 \end{cases}$$

where k is a constant.

- (a) Give the value of the one-sided limits $\lim_{x \rightarrow 2^-} f(x)$ and $\lim_{x \rightarrow 2^+} f(x)$.
 (b) Find the constant k which makes f continuous. Explain how you found k .