

Show all work and circle/box your final answer. All answers must be simplified unless stated otherwise. Turn in when done.

**1.** (5 points) Find the following limits:

(a)  $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$

(b)  $\lim_{x \rightarrow \infty} \frac{x^4 + 8x^2 + 9}{x^6 + 6x^2}$

**2.** (5 points) Find the following limits for  $f(x)$ :  $f(x) = \begin{cases} 8x - 3 & x \leq 1 \\ 4x^2 + 5 & x > 1 \end{cases}$

(a)  $\lim_{x \rightarrow 1^+} f(x)$

(b)  $\lim_{x \rightarrow 1^-} f(x)$

(c) Does  $\lim_{x \rightarrow 1} f(x)$  exist? If yes, what is its value? If no, explain why.