

- (1) (10 points) Determine on an intuitive basis (as in section 2.1) if the limit below exists, and if it does, evaluate it.

$$\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}.$$

*Solution.* We first observe that  $x^2 - 9 = (x + 3)(x - 3)$ , and thus since  $x \neq 3$ , we have that

$$\frac{x^2 - 9}{x - 3} = \frac{(x + 3)(x - 3)}{(x - 3)} = x + 3.$$

Therefore, we can intuitively evaluate the limit and find that

$$\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3} = \lim_{x \rightarrow 3} (x + 3) = 6. \quad \square$$