

2.2.25 Evaluate  $\lim_{x \rightarrow -5} \frac{x^2 + 3x - 10}{x + 5}$ .

Solution

Well,  $\frac{x^2 + 3x - 10}{x + 5}$  is a rational function. BUT we can't apply Theorem 2.3, "Limits of Rational Functions" because  $(x + 5)|_{x = -5} = (-5) + 5 = 0$  (i.e.,

the denominator is 0). SO we try to Factor / Cancel / Substitute:

$$\lim_{x \rightarrow -5} \frac{x^2 + 3x - 10}{x + 5} = \lim_{x \rightarrow -5} \frac{(x + 5)(x - 2)}{(x + 5)}$$

Factoring

$$= \lim_{x \rightarrow -5} (x - 2) \quad \underline{C} \text{anceling justified}$$

by Dr. Pab's Limit Theorem (Theorem 2.2.A)

$$= (-5) - 2 \quad \underline{S} \text{ubstituting, justified}$$

by Theorem 2.2, "Limits of Polynomials"

$$= \boxed{-7} \quad \square$$