

1. Let $f(x) = \frac{x^2}{x+1}$.

a. What is the domain of f ?

$$D_f: \{x \mid x \neq -1\}$$

b. Find $f'(x)$.

$$f'(x) = \frac{(x+1)(2x) - x^2}{(x+1)^2} = \frac{2x^2 + 2x - x^2}{(x+1)^2} = \frac{x^2 + 2x}{(x+1)^2}$$

c. Find all critical values of f .

top: $x^2 + 2x = 0$

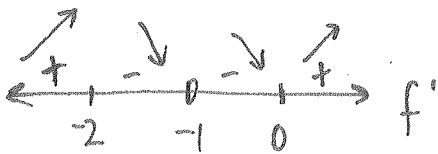
$x(x+2) = 0$

$x \neq 0 \quad x \neq -2$

bottom: $(x+1)^2 \neq 0$
 $x \neq -1$

$$CV's: -2, -1, 0$$

d. Make a sign chart for f' . On what intervals is f increasing and/or decreasing?



bottom always positive, so just check top.

$f'(-3) > 0$

$f'(-\frac{1}{2}) < 0$

$f'(-\frac{3}{2}) < 0$

$f'(1) > 0$

e. Find all local maxima and minima of f , if they exist.

local max at $x = -2$:

$f(-2) = \frac{4}{-1} = -4 \Rightarrow \text{max at } (-2, -4)$

local min at $x = 0$:

$f(0) = \frac{0}{1} = 0 \Rightarrow \text{min at } (0, 0)$

Inc: $(-\infty, -2) \cup (0, \infty)$

Dec: $(-2, -1) \cup (-1, 0)$