

**Calculus 1 Solved problems—Shape of functions**

**1.** Determine intervals of increase and decrease and identify local extrema of the following functions.

a)  $f(x) = \frac{x^2}{x-1}$ ,

b)  $f(x) = x e^{-|x|}$ .

**2.** Find the global extrema of the function  $f(x) = |x-3| \cdot (x+1)$  on the interval  $[0, 4]$ .

**3.** Determine intervals increase and decrease, intervals of concavity and find inflection points of the function

$$f(x) = \frac{e^x}{x}.$$

Find limits at endpoints of the domain and then sketch the shape of the function.

**4.** Find the domain and all asymptotes of the function

$$f(x) = x e^{\frac{2}{x}}.$$

**5.** Sketch the graph the following functions.

a)  $f(x) = \frac{|x-2|}{x}$ ,

b)  $f(x) = \ln(e^{3x} + 1)$ .