

**Problem 1: (15 points)** If it exists, find the limit. Use the symbols  $\infty$  or  $-\infty$  as appropriate.

a)  $\lim_{y \rightarrow 1} \frac{1-y^2}{y^3-1}$

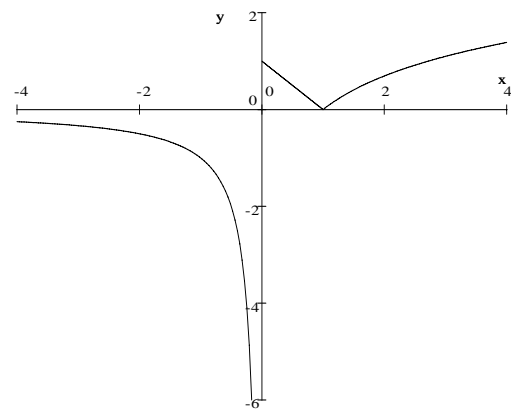
b)  $\lim_{x \rightarrow 1^-} (x - \lfloor 2x \rfloor)$

c)  $\lim_{x \rightarrow 5} \frac{\sqrt{x-1}-2}{x-5}$

d)  $\lim_{x \rightarrow 0} x^2 \cdot e^{\cos\left(\frac{1}{x}\right)}$

**Problem 2: (5 points)** consider the graph of the function  $f(x)$  whose graph is sketched below. Determine whether each of the following statements is true or false (CIRCLE ONE).

- |   |   |   |
|---|---|---|
| a. $\lim_{x \rightarrow 1} f(x) = 0$                    | T | F |
| b. $\lim_{x \rightarrow 1} f(x) = f(1)$                 | T | F |
| c. $\lim_{x \rightarrow 0} f(x) = -\infty$              | T | F |
| d. $\lim_{x \rightarrow 0^+} \frac{f(x)}{x-1} = \infty$ | T | F |
| e. $f(x)$ has a vertical asymptote                      | T | F |



**Problem 3: (10 points)** Use the  $\epsilon - \delta$  definition of the limit to show that  $\lim_{x \rightarrow 1^+} \sqrt{x-1} = 0$ .