1. Use a calculator to estimate to 4 decimal digits:

$$\lim_{h\to 0}\frac{\sqrt{2+h}-\sqrt{2}}{h} \approx 0.3536$$

you choose a few values

h	$\frac{\sqrt{2+h}-\sqrt{2}}{h}$
.001	.35351
.0001	.35355
-.001	.35360

(we will see soon why exact answer is

$$\frac{1}{2\sqrt{2}} = 0.353553\cdots)$$

2. Use a calculator to estimate to 4 decimal digits:

$$\lim_{x\to 0}\frac{x^2}{\cos(x)-1} \approx -2.000$$

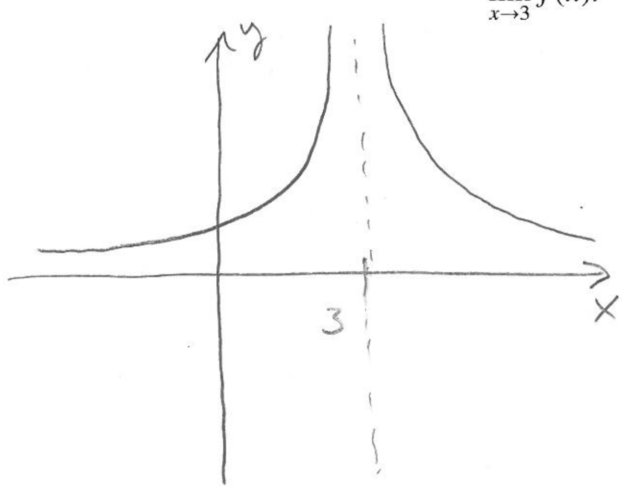
x	$\frac{x^2}{\cos(x)-1}$
.001	-2.0000
.0001	-2.0000
-.001	-2.0000

3. Sketch the graph of

$$f(x) = \frac{1}{(3-x)^2}.$$

Then determine

$$\lim_{x\to 3} f(x).$$



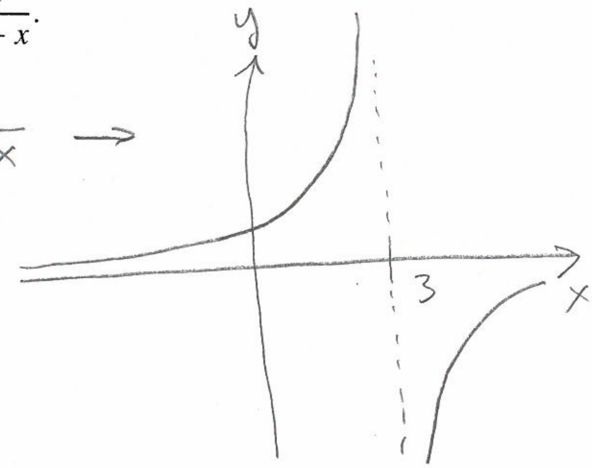
$$\lim_{x\to 3} f(x) = +\infty$$

4. Determine

$$\lim_{x\to 3^+} \frac{1}{3-x} \qquad \text{and} \qquad \lim_{x\to 3^-} \frac{1}{3-x}.$$

A sketch of the graph might be helpful.

$y = \frac{1}{3-x} \rightarrow$



$$\lim_{x\to 3^+} \frac{1}{3-x} = -\infty$$

$$\lim_{x\to 3^-} \frac{1}{3-x} = +\infty$$

5. Determine exactly

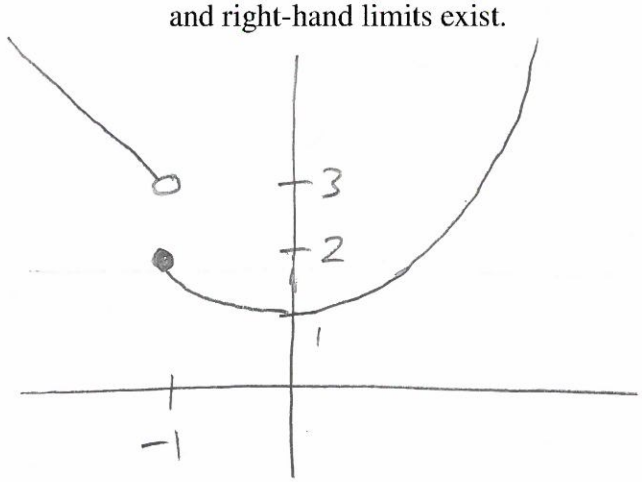
$$\lim_{x\to 2} \frac{x^2-7x+10}{x-2} = \lim_{x\to 2} \frac{\cancel{(x-2)}(x-5)}{\cancel{x-2}}$$

$$= \lim_{x\to 2} x-5 = -3$$

6. Suppose

$$g(x) = \begin{cases} x^2+1 & x \geq -1 \\ 2-x & x < -1. \end{cases}$$

Sketch the graph. Then determine if $\lim_{x\to -1} g(x)$ exists. If not, determine if the left- and right-hand limits exist.



$$\lim_{x\to -1} g(x) \text{ d.n.e.}$$

$$\lim_{x\to -1^-} g(x) = 3$$

$$\lim_{x\to -1^+} g(x) = 2$$