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

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

h	$\frac{\sqrt{2+h}-\sqrt{2}}{h}$
1	.3178
.1	.3492
.01	.3531
−1	.4142
−.1	.3581
−.01	.3540

.001	.3535
−.001	.3536
.0001	.35354...
−.0001	.35355...
.00001	.3535538
−.00001	.3535529

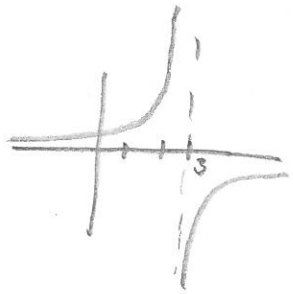
.3536

2. Determine

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

A sketch of a graph might be helpful.

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

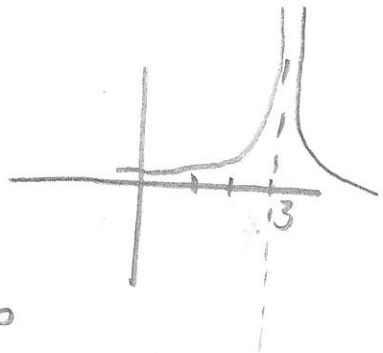


3. Sketch the graph of

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

and use it to determine

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

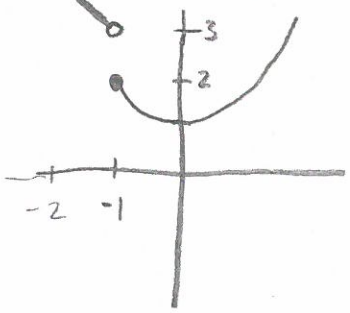


$\lim_{x\to 3}\frac{1}{(3-x)^2} = \infty$

4. 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. Give values for all of these limits that exist.



$\lim_{x \to -1}$ D.N.E.

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

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

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

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

x	$\frac{x^2}{\cos(x)-1}$
$\pm .1$	-2.001668
$\pm .01$	-2.000017
$\pm .001$	≈ -2

-2

6. Determine exactly:

$$\lim_{x \to 2} \frac{x^2 - 7x + 10}{x - 2} = \lim_{x \to 2} \frac{(x-2)(x-5)}{(x-2)} = \lim_{x \to 2} x - 5 = -3$$