Math 261 – Summer Lab 2   **Introduction to Limits**   Name_____

1. For each of the following functions, first complete the table. Then, based on the table values, find the given limits. If a limit does not exist, write *DNE*.

(a) $f(x) = \dfrac{x^2 - x - 6}{x - 3}$

x	2.9	2.99	2.999	2.9999		3.1	3.01	3.001	3.0001
$f(x)$									

$\displaystyle\lim_{x \to 3^-} f(x) =$ $\displaystyle\lim_{x \to 3^+} f(x) =$ $\displaystyle\lim_{x \to 3} f(x) =$

(b) $g(x) = \dfrac{|x - 3|}{x - 3}$

x	2.9	2.99	2.999	2.9999		3.1	3.01	3.001	3.0001
$g(x)$									

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

(c) $s(t) = \dfrac{1 - \cos t}{t^2}$

t	-0.1	-0.01	-0.001	-0.0001		0.1	0.01	0.001	0.0001
$s(t)$									

$\displaystyle\lim_{t \to 0^-} s(t) =$ $\displaystyle\lim_{t \to 0^+} s(t) =$ $\displaystyle\lim_{t \to 0} s(t) =$

(d) $E(x) = (1 + x)^{\frac{1}{x}}$

t	-0.1	-0.01	-0.001	-0.0001		0.1	0.01	0.001	0.0001
$E(x)$									

$\displaystyle\lim_{x \to 0^-} E(x) =$ $\displaystyle\lim_{x \to 0^+} E(x) =$ $\displaystyle\lim_{x \to 0} E(x) =$

2. Use the following graphs to find each of the limits or function values. If a limit does not exist, write *DNE*.

(a) $\lim_{x \to 1} f(x) =$

(b) $\lim_{x \to 0} g(x) =$

(c) $\lim_{x \to 1} h(x) =$

(d) $k(-2) =$

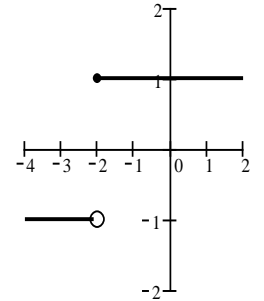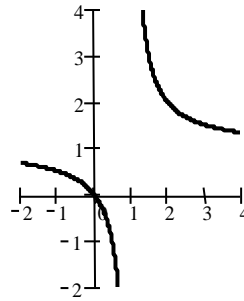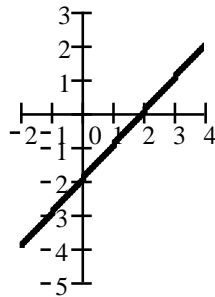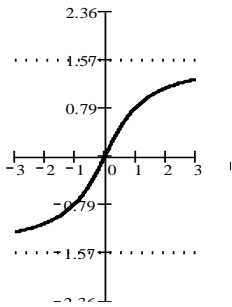$\lim_{x \to 0} f(x) =$

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

$\lim_{x \to 0} h(x) =$

$\lim_{x \to -2} k(x) =$

(e) $\lim_{x \to 1} m(x) =$

(f) $\lim_{x \to 2^-} a(x) =$

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

(h) $\lim_{x \to 0^-} w(x) =$

$\lim_{x \to -\infty} m(x) =$

$\lim_{x \to 2^+} a(x) =$

$\lim_{x \to 1^+} d(x) =$

$\lim_{x \to 0^+} w(x) =$

$\lim_{x \to \infty} m(x) =$

$\lim_{x \to 2} a(x) =$

$\lim_{x \to 1} d(x) =$
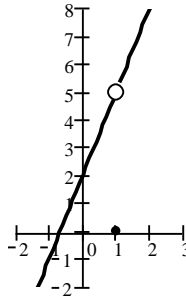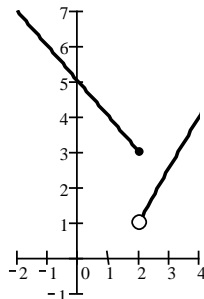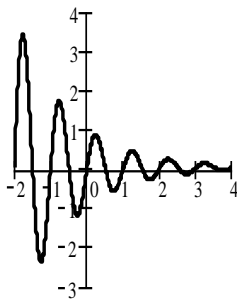
$\lim_{x \to 0} w(x) =$

$m(0) =$

$a(2) =$

$d(1) =$

$\lim_{x \to -\infty} w(x) =$

(i) $\lim_{x \to \pi} s(x) =$

(j) $\lim_{x \to 0} t(x) =$

(k) $\lim_{x \to 2^-} p(x) =$

(l) $\lim_{x \to 0} q(x) =$

$\lim_{x \to \frac{\pi}{2}^+} s(x) =$
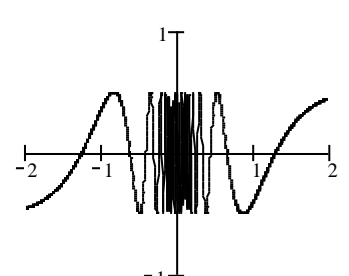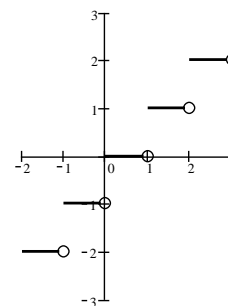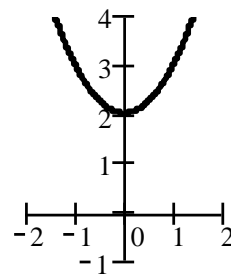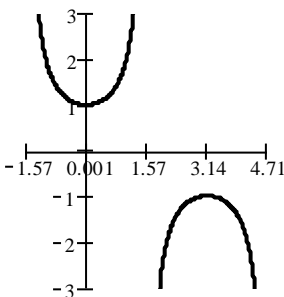
$\lim_{x \to 1} t(x) =$

$\lim_{x \to 2^+} p(x) =$

$\lim_{x \to -\infty} q(x) =$

$\lim_{x \to \frac{\pi}{2}} s(x) =$

$\lim_{x \to \infty} t(x) =$

$\lim_{x \to -\frac{1}{2}} p(x) =$

$\lim_{x \to \infty} q(x) =$

3. Use a δ - ε proof to prove that
$$\lim_{x \to 3} 2x - 4 = 2$$

3. Use a δ - ε proof to prove that
$$\lim_{x \to -2} 5x + 2 = -8$$