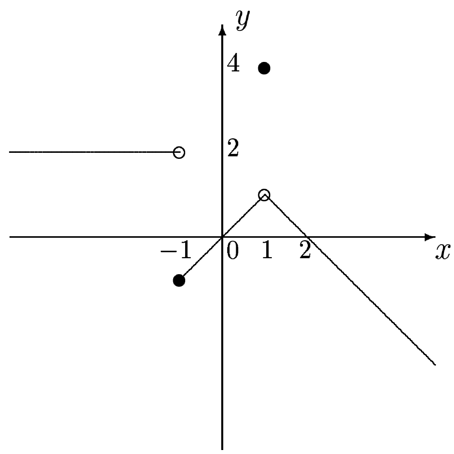
MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

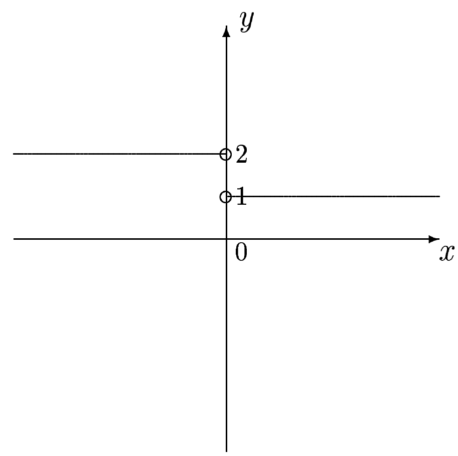
ASSIGNMENT 1 | **Mathematics 1000** | WINTER 2002

SOLUTIONS

1. (a)



(b) Note that $|2x| = 2|x| = 2x$ for $x > 0$, and $|2x| = -2x$ for $x < 0$. So $g(x) = 1$ for $x > 0$, $g(x) = 2$ for $x < 0$, and $g(0)$ is undefined.



2. (a) $\lim_{x\to 1} f(x) = 1$ (b) $\lim_{x\to 0} f(x) = 0$ (c) $\lim_{x\to -1} f(x)$ DNE, $\lim_{x\to -1^-} f(x) \neq \lim_{x\to -1^+} f(x)$

(d) $\lim_{x\to -2} f(x) = 2$ (e) $\lim_{x\to 2} g(x) = 1$ (f) $\lim_{x\to 0} g(x)$ DNE, $\lim_{x\to 0^-} g(x) \neq \lim_{x\to 0^+} g(x)$

3. (a) A possible table of values is:

x	-2.5	-2.2	-2.1	-2.01	-2.001	-2.0001	-1.9999	-1.999	-1.99	-1.9	-1.8	-1.5
$f(x)$	-1.5	-1.2	-1.1	-1.01	-1.001	-1.0001	-0.9999	-0.999	-0.99	-0.9	-0.8	-0.5

from which we deduce that $\lim_{x\to -2} \dfrac{x^2+3x+2}{x+2} = -1$.

(b) By cancellation, $\lim_{x\to -2} \dfrac{x^2+3x+2}{x+2} = \lim_{x\to -2} \dfrac{(x+2)(x+1)}{x+2} = \lim_{x\to -2}(x+1) = -1$.

4. (a) $$\lim_{x\to \frac{1}{2}} \frac{4x^2+8x-5}{2x^2+x-1} = \lim_{x\to \frac{1}{2}} \frac{(2x+5)(2x-1)}{(2x-1)(x+1)} = \lim_{x\to \frac{1}{2}} \frac{2x+5}{x+1} = 4$$

(b) $$\lim_{t\to 9} \frac{9-t}{3-\sqrt{t}} = \lim_{t\to 9} \frac{9-t}{3-\sqrt{t}} \cdot \frac{3+\sqrt{t}}{3+\sqrt{t}} = \lim_{t\to 9} \frac{(9-t)(3+\sqrt{t})}{9-t} = \lim_{t\to 9}(3+\sqrt{t}) = 6$$

(c) $$\lim_{x\to 3} \frac{3-x}{x^3-3x^2+x-3} = \lim_{x\to 3} \frac{-(x-3)}{(x^2+1)(x-3)} = \lim_{x\to 3} -\frac{1}{x^2+1} = -\frac{1}{10}$$

(d) $$\lim_{h\to -1} \frac{(2+h)^3-8}{h} = \frac{(2-1)^3-8}{-1} = 7$$

(e) $$\lim_{x\to 0} \frac{\sqrt{2-x}-\sqrt{2}}{x} = \lim_{x\to 0} \frac{\sqrt{2-x}-\sqrt{2}}{x} \cdot \frac{\sqrt{2-x}+\sqrt{2}}{\sqrt{2-x}+\sqrt{2}} = \lim_{x\to 0} \frac{-x}{x(\sqrt{2-x}+\sqrt{2})}$$