MEMORIAL UNIVERSITY OF NEWFOUNDLAND DEPARTMENT OF MATHEMATICS AND STATISTICS

Fall 2024

MATHEMATICS 1000 Assignment 1 **SOLUTIONS** 1. (a) $f(0) = \frac{7}{2}$ [14](b) $\lim_{x \to 0^{-}} f(x) = \frac{7}{2}$ (c) $\lim_{x \to 0^+} f(x) = -1$ (d) $\lim_{x\to 0} f(x)$ does not exist (because the one-sided limits are not equal) (e) f(2) = -1 $\lim_{x \to 2^-} f(x) = -1$ (f) (g) $\lim_{x \to 2^+} f(x) = -1$ (h) $\lim_{x \to 2} f(x) = -1$ (i) f(3) = -2(j) $\lim_{x \to 3^{-}} f(x) = 0$ (k) $\lim_{x \to 3^+} f(x) = 0$ (l) $\lim_{x \to 3} f(x) = 0$ (m) f(-3) is undefined (n) $\lim_{x \to -3^{-}} f(x) = -\infty$ $\lim_{x \to -3^+} f(x) = -\infty$ (0)

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

[3] 2. (a) First we consider values to the left of x = -1:

x	-2	-1.5	-1.1	-1.01	-1.001	-1.0001
f(x)	-0.0893	-0.1033	-0.1198	-0.1245	-0.1249	-0.12499

and then values to the right of x = -1:

x	0	-0.5	-0.9	-0.99	-0.999	-0.9999
f(x)	-0.2361	-0.1618	-0.1308	-0.1255	-0.1251	-0.12501

We can deduce that

$$\lim_{x \to -1^{-}} f(x) = -0.125 = -\frac{1}{8} \quad \text{and} \quad \lim_{x \to -1^{+}} f(x) = -\frac{1}{8},$$

and since these agree, we can conclude that

$$\lim_{x \to -1} f(x) = -\frac{1}{8}.$$

[3] (b) First we consider values to the left of x = 1:

x	0	0.5	0.9	0.99	0.999	0.9999
f(x)	-0.2361	-0.4603	-2.2579	-22.485	-224.76	-2247.5

and then values to the right of x = 1:

ſ	x	2	1.5	1.1	1.01	1.001	1.0001
	f(x)	0.2153	0.4396	2.2372	22.464	224.73	2247.4

We can deduce that

$$\lim_{x \to 1^{-}} f(x) = -\infty$$
 and $\lim_{x \to 1^{+}} f(x) = \infty$.

Since these disagree, we can only write that $\lim_{x \to 1} f(x)$ does not exist.