Numerical Limits

1. Evaluate $\lim_{x\to 3^-} f(x)$, $\lim_{x\to 3^+} f(x)$ *and* $\lim_{x\to 3} f(x)$

where $f(x) = \frac{1}{x-3}$

x	2.9	2.99	2.999	3	3.001	3.01	3.1
$f(x)$	−10	−100	−1000	DNE	1000	100	10

$\lim_{x\to 3^-} f(x) = -\infty$ { $\lim_{x\to 3} f(x)$ DNE b/c $\lim_{x\to 3^-} f(x) \neq \lim_{x\to 3^+} f(x)$ } $\lim_{x\to 3^+} f(x) = \infty$

2. Evaluate $\lim_{x\to -2^-} f(x)$, $\lim_{x\to -2^+} f(x)$ *and* $\lim_{x\to -2} f(x)$

where $f(x) = \frac{x^2-x-6}{x+2}$

x	−2.1	−2.01	−2.001	−2	−1.999	−1.99	−1.9
$f(x)$	−5.1	−5.01	−5.001	DNE	−4.999	−4.99	−4.9

$\lim_{x\to -2^-} f(x) = -5$ $\lim_{x\to -2} f(x) = 5$ $\lim_{x\to -2^+} f(x) = -5$

3. Evaluate $\lim_{x\to 0^-} f(x)$, $\lim_{x\to 0^+} f(x)$ *and* $\lim_{x\to 0} f(x)$

where $f(x) = \begin{cases} x+1 & x < 0 \\ x^2 & x \geq 0 \end{cases}$

x	−0.1	−0.01	−0.001	0	0.001	0.01	0.1
$f(x)$	0.9	0.99	0.999	0	.000001	.0001	.01

$\lim_{x\to 0^-} f(x) = 1$ $\lim_{x\to 0^+} f(x) = 0$

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

b/c $\lim_{x\to 0^-} f(x) \neq \lim_{x\to 0^+} f(x)$