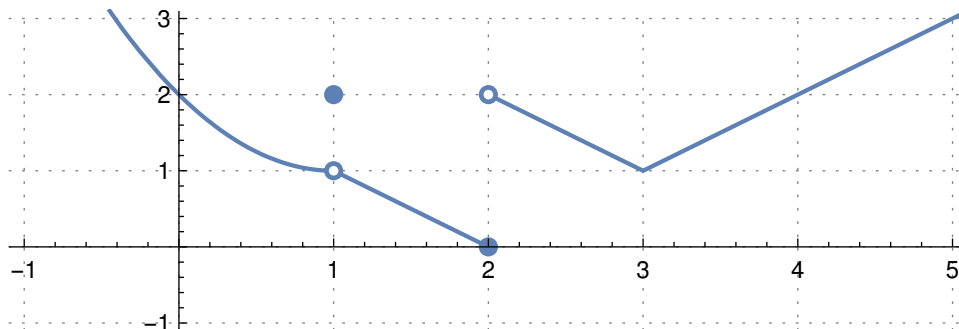# Quiz #2

Please print your name:

Problem 1. (5 points) Let $f(x)$ be the function graphed below. Determine the limits or state that they don't exist.

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

(d) $\lim\limits_{x \to 1^-} f(x) =$

(b) $\lim\limits_{x \to 2} f(x) =$

(e) $\lim\limits_{x \to 2^+} f(x) =$

(c) $\lim\limits_{x \to 3} f(x) =$

(f) $\lim\limits_{x \to 3^-} f(x) =$

Solution.

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

(d) $\lim\limits_{x \to 1^-} f(x) = 1$

(b) $\lim\limits_{x \to 2} f(x)$ does not exist

(e) $\lim\limits_{x \to 2^+} f(x) = 2$

(c) $\lim\limits_{x \to 3} f(x) = 1$

(f) $\lim\limits_{x \to 3^-} f(x) = 1$ □

Problem 2. (5 points) Determine $\lim\limits_{x \to 4} \dfrac{\sqrt{x+5} - 3}{x - 4}$.

Solution. We use the standard "trick" of multiplying both numerator and denominator with $\sqrt{x+5} + 3$.

$$
\begin{aligned}
\frac{\sqrt{x+5} - 3}{x - 4} &= \frac{(\sqrt{x+5} - 3)(\sqrt{x+5} + 3)}{(x - 4)(\sqrt{x+5} + 3)} \\
&= \frac{(x+5) - 3^2}{(x - 4)(\sqrt{x+5} + 3)} = \frac{x - 4}{(x - 4)(\sqrt{x+5} + 3)} = \frac{1}{\sqrt{x+5} + 3}
\end{aligned}
$$

Hence, $\lim\limits_{x \to 4} \dfrac{\sqrt{x+5} - 3}{x - 4} = \lim\limits_{x \to 4} \dfrac{1}{\sqrt{x+5} + 3} = \dfrac{1}{6}$. □