

# Limits Homework

FALL 2013

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1. Prove:  $\lim_{x \rightarrow 2} (x^2 + 3x - 4) = 6$

2. Prove:  $\lim_{x \rightarrow 2} (x^3 + 4) = 12$

3. Prove:  $\lim_{x \rightarrow 2} (x^3 - 5) = 3$

4. Prove:  $\lim_{x \rightarrow 1} \frac{x+2}{(x-1)^2} = \infty$

5. Prove:  $\lim_{x \rightarrow 1} \frac{x-2}{(x-1)^2} = -\infty$

6. Prove:  $\lim_{x \rightarrow 3^+} \frac{x+2}{x-3} = \infty$

**Hint:**  $x \rightarrow 3^+$  means that  $x$  approaches 3 from the right only. Thus,  $(x - 3) > 0$ .

So instead of  $|x - 3| < \delta$ , we require that  $0 < x - 3 < \delta$ .

7. Prove:  $\lim_{x \rightarrow 3^-} \frac{x+2}{x-3} = -\infty$

**Hint:**  $x \rightarrow 3^-$  means that  $x$  approaches 3 from the left only. Thus,  $(x - 3) < 0$ .

So instead of  $|x - 3| < \delta$ , we require that  $-\delta < x - 3 < 0$ .

Note, here we select  $\delta > 0$ .

8. Prove:  $\lim_{x \rightarrow \infty} \frac{3x+2}{x+5} = 3$