Name:

1.9 Computing Limits

Warm-up
Sketch one graph with all of the following features:

1. $\lim_{x \to -1^-} f(x) = 2$
2. $\lim_{x \to -1^+} f(x) = 0$
3. $f(-1) = 4$
4. $\lim_{x \to \infty} f(x) = 4$

1. Evaluate the following limits, or state that the limit does not exist.

   (a) $\lim_{x \to 3} \dfrac{x+1}{x+3}$

   (b) $\lim_{b \to 2} e^{4-b^2} - 1$

   (c) $\lim_{x \to 3} \dfrac{x^2 - x - 6}{x - 3}$

   (d) $\lim_{r \to -\infty} \dfrac{r^4 + 5r^2}{5r + r^3}$

(e) $\lim_{t\to 4} \dfrac{t-4}{\sqrt{t}-2}$

(f) $\lim_{h\to 0} \dfrac{(3+h)^2-9}{h}$

(g) $\lim_{z\to 1} \dfrac{z-1}{z^2-2z+1}$

Squeeze Theorem
If $b(x) \le f(x) \le a(x)$ for all x close to $x = c$ and $\lim_{x\to c} b(x) = L = \lim_{x\to c} a(x)$, then

2. Evaluate the following limit:
$\lim_{x\to 0} x^3 \cos\left(\dfrac{1}{x}\right)$

3. Bonus limits.

(a) $\lim_{t\to 1} \dfrac{|t|-1}{t-1}$

(b) $\lim_{x\to 4} \dfrac{x-\sqrt{3x+4}}{4-x}$

(c) $\lim_{n\to\infty} \sqrt{n^2+5n} - n$

(d) $\lim_{x\to 0} \dfrac{5\cos x \sin x}{x}$