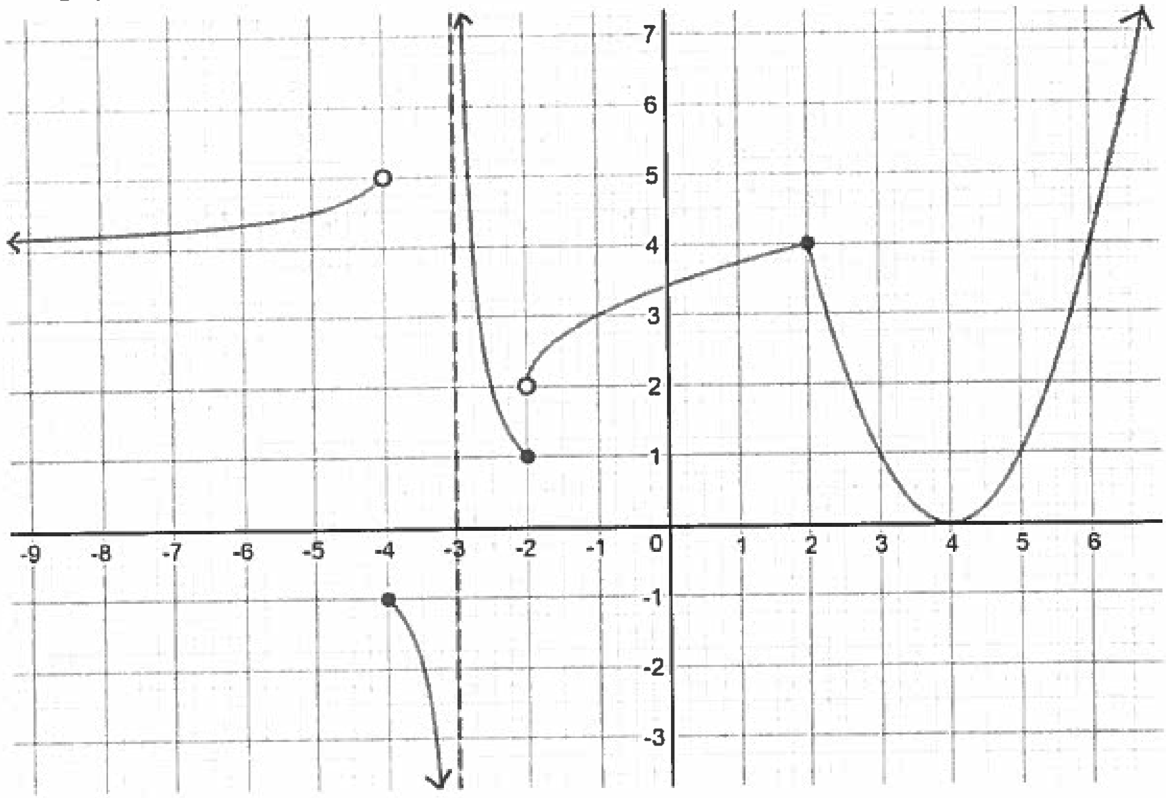
AB Calculus Infinite Limits Practice

Name: Key

1. Given the graph of f(x) below, find the following limits:



a) $\lim_{x\to -4^-} f(x) =$ 5

b) $\lim_{x\to -\infty} f(x) =$ 4

c) $\lim_{x\to -4^+} f(x) =$ -1

d) $\lim_{x\to 4} f(x) =$ 0

e) $\lim_{x\to -4} f(x) =$ DNE

f) $\lim_{x\to 3^-} f(x) =$ 1

g) $f(-4) =$ -1

h) $f(3) =$ 1

i) $\lim_{x\to 2} f(x) =$ 4

j) $\lim_{x\to \infty} f(x) =$ ∞

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

l) $\lim_{x\to -3^+} f(x) =$ ∞

m) $\lim_{x\to -3} f(x) =$ DNE

n) $\lim_{x\to -2^-} f(x) =$ 1

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

p) $\lim_{x\to -2} f(x) =$ DNE

q) $f(-3) =$ und.

r) $f(-2) =$ 1

s) $\lim_{x\to -1} f(x) =$ 3

t) $\lim_{x\to 5} f(x) =$ 1

2. Find the following limits algebraically.

a) $\lim_{x\to -1^-} \frac{(x-1)(x-2)}{x+1}$ $-\infty$

b) $\lim_{t\to 6} \frac{t-6}{t^2-36}$ $\frac{t-6}{(t-6)(t+6)} \to \frac{1}{t+6} = \frac{1}{12}$

c) $\lim_{x\to 10} \frac{\frac{1}{x-6} - \frac{2}{x-2}}{x-10}$ $x-2-2x+12$ $\frac{\frac{-x+10}{x-10} = -1}{(x-6)(x-2)}$ $= \frac{-1}{32}$

d) $\lim_{x\to -3} \frac{4x^2+17x+15}{x+3}$ $\frac{(4x+5)\cancel{(x+3)}}{\cancel{x+3}}$ $-12+5 = -7$

e) $\lim_{x\to\infty} \frac{\sqrt{x}}{x}$ $= 0$

f) $\lim_{x\to -1} -\frac{5}{x^2+2x+1}$ $-\frac{5}{(x+1)^2}$ $= -\infty$

g) $\lim_{x\to\infty} \frac{4+3x-5x^3}{x^2+1}$ $\frac{-5x^3}{x^2} \to -5x \to -\infty$

h) $\lim_{x\to 0} \frac{x}{\sqrt{x+1}-1}$ $\cdot \frac{\sqrt{x+1}+1}{\sqrt{x+1}+1} = \frac{x(\sqrt{x+1}+1)}{x\cancel{+1-1}} = 2$

i) $\lim_{x\to -\infty} \frac{5x^2+2x-3}{6x^2+4x-2} = \frac{5}{6}$

j) $\lim_{x\to\infty} \frac{2x+3^{-x}}{3x+3^{-x}}$ $3^{-\infty} \to 0$ $= \frac{2}{3}$

k) $\lim_{x\to\infty} \frac{\sqrt{3x^4+x}}{x^2-8}$ $\frac{\sqrt{3}x^2}{x^2} = \sqrt{3}$

l) $\lim_{x\to 0} \frac{\sin 3x}{3x^2+9x}$ $\frac{\overset{1}{\cancel{\sin 3x}}}{\cancel{3x}(x+3)} \to \frac{1}{3}$

3.
$$f(x) = \begin{cases} \frac{1}{x+1}, & x \geq 0 \\ 2^x+3, & x<0 \end{cases}$$
$\frac{1}{1} = 1$

$2^0+3 = 4$

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

b) $\lim_{x\to -1} f(x)$ $2^{-1}+3$ $\frac{1}{2}+3 = \frac{7}{2}$

c) $\lim_{x\to\infty} f(x)$ 0

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

4. Use the sandwich theorem to find $\lim_{x\to 4} f(x)$ if $-x+9 \leq f(x) \leq \frac{4x-11}{x-3}$

$\frac{4(4)-11}{4-3} = \frac{16-11}{1} = 5$

$-4+9=5$

$\lim_{x\to 4} f(x) = 5$

b/c of sandwich theorem