Week 2 Recitations MATH:113, Recitations 304 and 305

Names: _____

1. What are the limits of these *sequences*? Discuss, and plot at least one sequence on a whiteboard. (*Hint: the limit of Q is a special number that shows up often!*)

$$P = \{1, 1/2, 1/3, 1/4, \dots\} \qquad Q = \left\{ \left(1 + \frac{1}{n}\right)^n \right\}_{n=1}^{\infty} \qquad R = \left\{ \sin(n) \right\}_{n=0}^{\infty}$$

2. Find the domain and range of three of the following functions. On a whiteboard, sketch the curves for two of your chosen functions.

$$f(x) = 1/x$$
 $g(x) = \ln(x)$ $h(x) = x^2$ $p(x) = x^2 + 1$ $q(x) = x^3$

Some notes.

1. Symbolically,

 $\lim_{x \to p^+} f(x)$

reads "the limit of f(x) as x approaches p from above" — this means that x is always bigger than p, but is getting smaller as it gets closer to p. Similarly,

 $\lim_{x\to p^-} f(x)$

reads "the limit of f(x) as x approaches p from below" — this means that x is always smaller than p, but is getting bigger as it gets closer to p.

2. We say that

$$\lim_{x \to p} f(x) = L$$

if and only if the upper and lower limits of f at p are the same. That is,

 $\lim_{x \to p} f(x) = L$

is equivalent to

$$\lim_{x \to p^{+}} f(x) = L = \lim_{x \to p^{-}} f(x).$$

3. Find these limits, and sketch a curve on a whiteboard for each limit you find.

$$\lim_{x \to \infty} \frac{1}{x} \qquad \qquad \lim_{x \to 0} \frac{1}{x}$$

define
$$f$$
 as $f(x) = \begin{cases} (x+1)^2 & x < 0\\ x^2 + 2 & x > 0 \end{cases}$
$$\lim_{x \to 0^-} f(x) \qquad \lim_{x \to 0^+} f(x) \qquad \lim_{x \to 0} f(x)$$