University of Utah
Math 1210, Spring 2008
Name: Solutions

Quiz # 2

Time: 15 minutes

Show all work.

Part 1: (3 points) Consider the function $f(x) = \frac{x^2-4x+5}{\sqrt{x+1}}$. What is the domain of f? Find the limit of $f(x)$ as $x \to 3$.

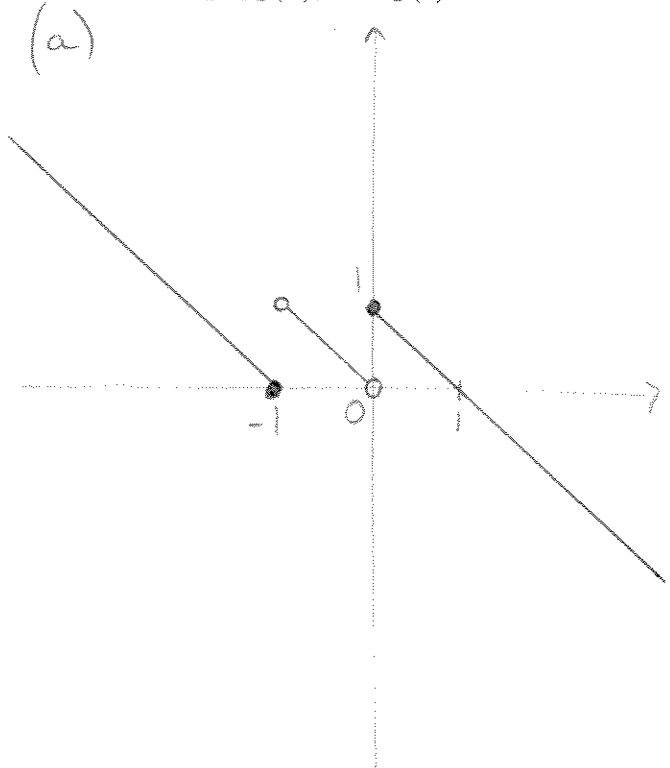
* f is defined when $x+1 \geqslant 0$ and $\sqrt{x+1} \neq 0$, i.e. when $x+1>0$.
So the domain of f is $\{x / x+1>0\} = (-1, \infty)$

* f is a combination of polynomials and square roots, whose denominator is non-zero for $x=3$. Therefore we can just "plug in $x=3$":

$$\lim_{x\to 3} f(x) = f(3) = \frac{3^2-4.3+5}{\sqrt{3+1}} = 1$$

Part 2: (7 points). Consider the function g defined by $g(x) = -x-1$ if $x \leqslant -1$, $g(x) = -x$ if $-1 < x < 0$, and $g(x) = -x+1$ if $x \geqslant 0$. (a) Sketch the graph of g. (b) For $c = -1$ then $c = 0$ find each of the following (or state that it does not exist): $\lim_{x\to c^-} g(x)$, $\lim_{x\to c^+} g(x)$, $\lim_{x\to c} g(x)$, and $g(c)$.

(a)



(b) $\lim_{x\to -1^-} g(x) = 0$, $\lim_{x\to -1^+} g(x) = 1$

so $\lim_{x\to -1} g(x)$ does not exist

(the left-and right-hand side limits exist but are different)

$g(-1) = 0$

$\lim_{x\to 0^-} g(x) = 0$, $\lim_{x\to 0^+} g(x) = 1$

so $\lim_{x\to 0} g(x)$ does not exist (same reason).

$g(0) = 1$