Math 108 turn in homework #4 Name <u>ANSWER KEY</u>
Due Monday, February 16, 2009 at the beginning of class

Be sure to show all of your work neatly. Answers with no work receive no credit.

1. Find the following limits, if they exist. Otherwise, write DNE.

   a) $\lim\limits_{x\to-3}\dfrac{x+3}{x^2-9} = \lim\limits_{x\to-3}\dfrac{(x+3)\,1}{(x+3)(x-3)} = \dfrac{1}{-3-3} = \boxed{-\dfrac{1}{6}}$

   $\dfrac{-3+3}{9-9} = \dfrac{0}{0}$: keep going

   b) $\lim\limits_{x\to2}\dfrac{x}{x-2}$ $\boxed{DNE}$

   plug in: $\dfrac{2}{2-2} = \dfrac{2}{0}$

   c) $\lim\limits_{x\to-1}\dfrac{x+1}{x^2+1} = \dfrac{0}{2} = \boxed{0}$

   plug in: $\dfrac{0}{2}$

   d) $\lim\limits_{x\to-2}\dfrac{x^2+3x+2}{x^2+4x+4} = \lim\limits_{x\to-2}\dfrac{(x+2)(x+1)}{(x+2)(x+2)}$ $\boxed{DNE}$

   $\dfrac{4-6+2}{4-8+4} = \dfrac{0}{0}$: keep going $\dfrac{-1}{0}$

   e) $\lim\limits_{x\to-3}\dfrac{x+3}{x^2+4x+3} = \lim\limits_{x\to-3}\dfrac{(x+3)\,1}{(x+3)(x+1)} = \dfrac{1}{-3+1} = \boxed{-\dfrac{1}{2}}$

   $\dfrac{0}{9-12+3} = \dfrac{0}{0}$: keep going

   f) $\lim\limits_{x\to-1}\dfrac{x+3}{x^2+4x+3}$ $\boxed{DNE}$

   plug in $\dfrac{-1+3}{1-4+3} = \dfrac{2}{0}$

   g) Problem 12, p. 69 $\lim\limits_{x\to-1}(x^2+1)(1-2x)^2 = \boxed{18}$

   plug in $(1+1)(1+2)^2 = 2(3)^2 = 2\cdot 9$

2. Do problem 42 on page 71, completing the table as directed and estimating the indicated limit. Your answer should include the completed table and your estimate of the limit.

$\lim\limits_{x\to-1}\dfrac{x^3+1}{x+1}$:

x	-1.1	-1.01	-1.001	-1	-.999	-.99	-.9
f(x)	3.31	3.0301	3.003001	✗	2.997001	2.9701	2.71

$\boxed{\lim\limits_{x\to-1}\dfrac{x^3+1}{x+1} = 3}$

$\to 3$

3. Estimate the following limit, $\lim\limits_{x\to8}\dfrac{2-\sqrt[3]{x}}{x-8}$, or show that the limit does not exist, using a table similar to the one you used in problem 2 above. NOTE: be sure to note carefully what value the variable x is approaching. Your answer should include the completed table and your estimate of the limit.

x	7.9	7.99	7.999	8	8.001	8.01	8.1
f(x)	-.083683 / -.083368	-.083335	-.0833299 / -.0833298	✗	-.0832986	-.0829885	

$\lim\limits_{x\to8}\dfrac{2-\sqrt[3]{x}}{x-8} = \boxed{-.0833\overline{3}}$

$\to -.0833\overline{3}?$ $\leftarrow -.0833\overline{3}$

$= \boxed{-\dfrac{1}{12}}$

20