Math 121 Sec F08N05 - Quiz 2
Sep 19 2008

Name: SOLUTIONS
Stu#:

(1)[5 points] Let $f(x) = x + \frac{1}{x}$ and $g(x) = \frac{x+1}{x+2}$. Find and simplify $f \circ g$ and state the domain.

$$(f \circ g)(x) = f(g(x))$$

$$= \left(\frac{x+1}{x+2}\right) + \frac{1}{\left(\frac{x+1}{x+2}\right)}$$

$$= \frac{x+1}{x+2} + \frac{x+2}{x+1}$$

$$= \frac{(x+1)^2+(x+2)^2}{(x+1)(x+2)}$$

$$= \frac{2x^2+6x+5}{x^2+3x+2}$$

domain:
because of first term, $x \neq -2$;
because of second term, $x \neq -1$.

$\therefore$ domain is
$(-\infty,-2) \cup (-2,-1) \cup (-1,\infty)$.

(2)[5 points] Evaluate

$$\lim_{x\to 2} \frac{x^2+x-6}{x-2}$$

$$= \lim_{x\to 2} \frac{\cancel{(x-2)}(x+3)}{\cancel{(x-2)}}$$

$$= 5$$

(3)[5 points] Evaluate

$$\lim_{x\to 7} \frac{\sqrt{x+2}-3}{x-7}$$

$$= \lim_{x\to 7} \frac{\sqrt{x+2}-3}{x-7} \cdot \frac{\sqrt{x+2}+3}{\sqrt{x+2}+3}$$

$$= \lim_{x\to 7} \frac{x+2-9}{(x-7)(\sqrt{x+2}+3)}$$

$$= \lim_{x\to 7} \frac{\cancel{(x-7)}}{\cancel{(x-7)}(\sqrt{x+2}+3)}$$

$$= \frac{1}{6}$$