Instructions: Write complete legible solutions to the following problems in the space provided. Be sure to supply all the necessary steps that lead to your answers.

1.   Find the limit if it exists.

a. $\displaystyle\lim_{(x,y)\to(1,0)} = \frac{1+y^2}{x^2+xy}$

b. $\displaystyle Lim_{(x,y)\to(0,0)} \frac{5y^4\cos 2x}{x^4+y^4}$

b. $\displaystyle Lim_{(x,y,z)\to(0,0,0)} \frac{xy+yz}{x^2+y^2+z^2}$

c. $\displaystyle Lim_{(x,y)\to(0,0)} \frac{x^2+y^2}{x^4-y^4}$

2. Determine the set of points at which the function is continuous.

a. $f(x,y) = \cos\sqrt{1+x-y}$

b. $f(x,y) = \tan^{-1}\left(\dfrac{1}{(x-y)^2}\right)$

3. Determine the set of points at which the function is continuous.

$$f(x,y) = \begin{cases} \dfrac{x^2 y^3}{2x^2 + y^2} & (x,y) \neq (0,0) \\ 0 & (x,y) = (0,0) \end{cases}$$

4. Use polar coordinates to find the limit. $\displaystyle\lim_{(x,y)\to(0,\,0)} \dfrac{6e^{-x^2-y^2} - 6}{x^2 + y^2}$