In-Class Quiz 3:
Limits and continuity (§12.3)

Directions: This quiz is due at the end of lecture.

1. Which of the following limits exist?

   (a) $\lim_{(x,y)\to(1,1)} 3x^{12}y^2$

   $$= 3(1)^{12}(1)^2 = 3 \quad \underline{\text{exists}}.$$

   (b) $\lim_{(x,y)\to(0,0)} 3x^{-2}y^2 = \lim_{(x,y)\to(0,0)} \frac{3y^2}{x^2}$. Let $(x,y)\to(0,0)$ along the line $y=mx$.

   $$= \lim_{(x,mx)\to(0,0)} \frac{3(mx)^2}{x^2} = \lim_{(x,y)\to(0,0)} \frac{3m^2 x^2}{x^2} = 3m^2 \leftarrow \text{different for different values of } m$$

   $\Rightarrow \underline{\text{does not exist}}$.

   (c) $\lim_{(x,y)\to(1,2)} \sqrt{x-y^2}$

   defined on the set

   $$\{(x,y) \mid x \geq y^2\}.$$

   Since $(1,2)$ is not an interior or boundary point of that set, the limit <u>does not exist</u>.