"QUIZ" for Lecture 6

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q6FirstLast.pdf) ASAP BUT NO LATER THAN Sept. 24, 8:00pm

1. Find the limit if it exists, or show that the limit does not exist.

$$\lim_{(x,y)\to(0,0)} \frac{2x}{2x+3y} = \frac{0}{0}$$

$y = cx$

$$\lim_{x\to 0} \frac{2x}{2x+3cx} = \frac{2x}{x(2+3c)} = \frac{2}{2+3c} = \text{DNE}$$

2. Find the limit if it exists, or show that the limit does not exist.

$y = cx$

$$\lim_{(x,y)\to(0,0)} \frac{x^5}{x^2+y^2} = \frac{0}{0}$$

$$\lim_{x\to 0} \frac{x^5}{x^2+(cx)^2} \to \frac{x^5}{x^2(1+c^2)} = \frac{x^3}{1+c^2}$$

$x = r\cos\theta \quad y = r\sin\theta$

$$f(r\cos\theta, r\sin\theta) = \frac{(r\cos\theta)^5}{(r\cos\theta)^2+(r\sin\theta)^2} = \frac{r^5\cos^5\theta}{r^2\cos^2\theta+r^2\sin^2\theta} = \frac{r^5\cos^5\theta}{r^2(\cos^2\theta+\sin^2\theta)}$$

$$= \frac{r^5\cos^5\theta}{r^2\cdot 1} = r^3\cos^5\theta$$

$$\lim_{r\to 0} r^3\cos^5\theta = 0$$

$$\lim_{(x,y)\to(0,0)} \frac{x^5}{x^2+y^2} = 0$$