"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.

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

(1) $(x,y) \to (0,0)$ both top and bottom vanish so move on to the next step.

(2) $y = cx \longrightarrow \lim_{x\to 0} \frac{2x}{2x+3cx}$ = depends on c so we get different limits for different lines so DNE

∴ The limit DNE since you get different limits when you approach the point (0,0) on different lines.

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

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

(1) $(x,y) \to (0,0)$ both top and bottom vanish

(2) $y = cx \longrightarrow \lim_{x\to 0} \frac{x^5}{x^2+c^2x^2} = 0$ (doesn't depend on c)

(3) $x = r\cos\theta$, $y = r\sin\theta$ $\longrightarrow \lim_{r\to 0} \frac{(r\cos\theta)^5}{r^2\cos^2\theta + r^2\sin^2\theta} = \lim_{r\to 0} \frac{(r^5\cos^5\theta)}{r^2(\cos^2\theta+\sin^2\theta)}$

$= \lim_{r\to 0} \frac{r^3\cos^5\theta}{1} = \lim_{r\to 0} r^3\cos^5\theta = 0$

∴ The limit exists and equals 0.