MATH 203 QUIZ 4 - Version A out of 13

June 12, 2014

Name: ANSWERS

Instructions: (1) No calculators! (2) Use your own scrap paper. Write your answers in the space provided.

1. Give the formula for the equation of a plane, and the meaning of the symbols used:

$a(x-x_0)+b(y-y_0)+c(z-z_0)=0$ Meanings (x_0,y_0,z_0) – point on plane, $\vec{n}=\langle a,b,c\rangle$ – normal vector

2. Let $\mathbf{r}(t)=\langle x(t), y(t)\rangle$. What is

(a) $\lim_{t\to a}\mathbf{r}(t) = \langle \lim_{t\to a} x(t), \lim_{t\to a} y(t)\rangle$ (b) $\mathbf{r}'(t) = \langle x'(t), y'(t)\rangle$

3. Let $\mathbf{r}(t)=\left\langle te^t, \frac{1}{t-2}, \ln t - 5\right\rangle$. (a) What is the domain of $\mathbf{r}(t)$? $t\in(0,2)\cup(2,\infty)$

(b) Compute $\mathbf{r}'(t) = \langle te^t+e^t, -\frac{1}{(t-2)^2}, \frac{1}{t}\rangle$

(c) Compute $\int \mathbf{r}(t)\,dt = \langle te^t-e^t, \ln|t-2|, t\ln t-6t\rangle+\vec{C}$

(d) Compute $\lim_{t\to e^5}\mathbf{r}(t) = \langle e^5e^{e^5}, \frac{1}{e^5-2}, 0\rangle$

4. Find an equation for the plane that passes through (2,3,-1) that contains the line $\langle x,y,z\rangle=\langle 3,-1,0\rangle+t\langle 5,-1,1\rangle$

$3(x-2)-4(y-3)-19(z+1)=0$

5. Find the equation of the line through (1,2,3) that is orthogonal to the plane $2x-3y+5z=5$

$\langle x,y,z\rangle=\langle 1,2,3\rangle+t\langle 2,-3,5\rangle$

6. Find the point of intersection of the line $L:\ x=1+3t,\ y=-2t,\ z=1+t$ and the plane $x+y+z=6$

$(7,-4,3)$

7. Give the formula for the unit tangent vector for a function $\mathbf{r}(t)$

$\vec{T}(t)=\frac{\vec{r}\,'(t)}{|\vec{r}\,'(t)|}$

8. Find the equation of the tangent line to the curve $\mathbf{r}(t)$ in problem **3.** at the point $(e,-1,-5)$

$\langle x,y,z\rangle=\langle e,-1,-5\rangle+t\langle 2e,-1,1\rangle$

Bonus: Sketch the level curves of $z=x^2+y^2$ in the xy-plane: