Math 208 Summer II 2007 **Exam 1**

Name: _____ **Score:** _____

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1(18pts) Three points in the space are given: $P(0,1,2), Q(2,0,1), R(-1,-1,1)$.

(a) Find the area of the triangle ΔPQR.

(b) Find an equation of the plane containing the points.

(c) Find a parametric equation of the line through point R and perpendicular to the plane.

2(7pts) Find the angle between two planes: $x + y + z = 1$ and $x - y - z = 10$.

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3(10pts) Three points in the space are given: $P(1,0,0), Q(0,2,0), R(1,2,3)$.

(a) Find the projection of vector $\vec{PR}$ on $\vec{PQ}$: $\mathbf{proj}_{\vec{PQ}}\vec{PR}$.

(b) Is the vector $\vec{PR} - \mathbf{proj}_{\vec{PQ}}\vec{PR}$ parallel or perpendicular to $\vec{PQ}$? Sketch a picture to explain.

4(7pts) The acceleration of a moving particle is given as $\vec{a}(t) = \langle e^{2t}, \frac{2}{1+t^2}, t\sin t^2\rangle$. Find its velocity $\vec{v}(t)$ if $\vec{v}(0) = \langle 0,1,1\rangle$.

5(8pts) Determine if the following two lines intersect: $x = 1+t, y = -1+2t, z = 2-t$, and the line through points $P(-1,0,3), Q(-3,-1,2)$. Find the intersection point if they do.

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6(6pts) Find the distance from the point $(3, 2, 1)$ to the plane through the origin and parallel with $x-y-z = 2$.

7(7pts) Find the distance from the point $(0, 1, 1)$ to the line which goes through $(1, 0, 1)$ and is perpendicular to the plane $x + y + 2z = 3$.

8(12pts) A baseball is thrown from the stands 32 ft above the field at an angle of 30° up from the horizontal. When and how far away will the ball strike the ground if its initial speed is 32 ft/sec? (The gravitation constant is 32 ft/sec^2.)

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9(7pts) Find an parametric equation for the line tangent to the curve $\vec{r}(t) = \langle t, \cos t^2, \ln(t^2+1)\rangle$ at the point when $t = 0$.

10(6pts) Sketch an assortment of level curves for the function $z = 2xy$ and label each level curve with its function value.

11(12pts) Find the limit if exists. If the limit does not exist, explain why not.

(a) $\lim\limits_{(x,y)\to(1,0)} \dfrac{xy}{x^2 - y - 1}$

(b) $\lim\limits_{(x,y)\to(1,3)} \dfrac{x+y-4}{\sqrt{x+y}-2}$

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2 Bonus Points: Calculus was invented in: (a) Europe. (b) America. (c) India. (d) Egypt. (... *The End*)