FALL 2008 — MA 227- 7B — TEST 1

Name: _____

1. Part I

There are 6 problems in Part 1, each worth 4 points. Place your answer on the line to the right of the question. Only your answer on the answer line will be graded.

(1) Find the cross product of the vectors $\langle 2, 2, 1\rangle$ and $\langle 1, 0, 1\rangle$.

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(2) Find the dot product of the vectors $\langle 2, -2, 4\rangle$ and $\langle 2, 1, -1\rangle$. _____

(3) Find the vector equation that represents the curve of intersection of the cylinder $x^2 + z^2 = 1$ and the plane $y = 2$.

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(4) Find the length of the arc with vector equation $r(t) = \langle \cos t, \sin t\rangle$ from the point $(1, 0)$ to the point $(-1, 0)$.

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(5) Find a vector function representing the line (a parametrization of the line) passing through the points $P(0, 0, 0)$ and $Q(0, 3, 2)$.

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(6) Find an equation of the plane with normal $\mathbf{i}+\mathbf{j}+\mathbf{k}$ which contains the point $P(0, 0, 0)$.

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2. Part II

There are 3 problems in Part 2, each worth 12 points. On Part 2 problems partial credit is awarded where appropriate. Your solution must include enough detail to justify any conclusions you reach in answering the question.

(1) A ball is thrown at an angle of 45 degrees to the ground. It lands $4/5m$ away.
   (a) Find the initial speed.
   (b) Find the maximum height reached.
   (c) Find the speed at impact.

   Use $g = 10m/s^2$.

(2) At what points does the curve $r(t) = t\mathbf{i} + 4\mathbf{j} + (4t + 3t^2)\mathbf{k}$ intersect the paraboloid $z = x^2 + y^2$.

(3) Find an equation of the plane passing through $A(1, 1, -1)$, $B(0, 1, 3)$, and $C(3, 2, 0)$. What is the angle between this plane and the xz-plane?