Math 210 Summer 92 — Calculus III — Exam #1 — Berger — page 1 of 2

Show work on this sheet in 60 minutes ((5 × 10 + 50 = 100)pts).

Name ______________________________.   *SocSecNo.* ______________________.

1. Let $\vec{a} =< 1, 1, 1 >$, $\vec{b} =< 3, 4, 5 >$ $\vec{c} =< 0, 1, 0 >$

   (a) Find the **Volume** of the solid whose **sides** are given by the vectors $\vec{a}$, $\vec{b}$, and $\vec{c}$.

   (b) Find the $\cos(\angle(\vec{a}, \vec{b}))$:

   (c) Find any non-zero vector perpendicular to both $\vec{a}$ and $\vec{b}$:

2. Let $\vec{a}$ be any vector, and $\vec{u}$ be a **unit** vector. Show that: $\vec{a} - (\vec{a} \cdot \vec{u})\,\vec{u}$ is Orthogonal to $\vec{u}$.

3. Find the Normal vector and the Vector Equation of the Plane passing through the three points $(0, 0, -1)$, $(2, 0, 5)$ and $(0, 1, 7)$.

4. Find the Vector Equation of the Line passing through the two points $(1, 1, 1)$ and $(2, 2, 2)$.

5. Reduce to standard form, Classify, and Sketch the Surface, $4x^2 + y^2 + 2z^2 - 2y + 1 = 9$.

6. Given the position vector $\vec{r}(t) = \sin(2t)\vec{i} + \cos(2t)\vec{j} + t\vec{k}$, find the

   (a) Velocity:

   (b) Acceleration:

   (c) Speed:

   (d) Unit Tangent Vector:

   (e) Arclength for the segment traced out when t varies from π to 2π:

   (f) Unit Normal Vector as a function of t:

   (g) Curvature as a function of t: