Math 208 Quiz 2 Solution Key

Name:____________________ PIN(in any 4 digits):____________ Score:____________

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

1. (*4*) Find the distance between the point $(1, 1, 1)$ and the plane $x + 2y + z = 0$.

   $4/\sqrt{6}$

2. (*4*) Sketch the surface of the equation $4x^2 - y + z^2 = 1$, showing a few appropriate traces.

   y-traces: ellipses for $y = k > -1$. Trace with $x = 0$: parabala. Trace with $z = 0$: parabola. Surface: elliptical parabaloid, open to the y-axis, with vertex at $(0, -1, 0)$.

3. (*4*) Find the position function of a moving objection whose acceleration is $\vec{a}(t) = \langle t, 1, \sin 2t\rangle$, and whose initial velocity and position are $\vec{v}(0) = \langle 0, 1, 0\rangle$, $\vec{r}(0) = \langle 1, 1, 1\rangle$, repectively.

   $\vec{r}(t) = (\frac{t^3}{6} + 1, \frac{t^2}{2} + t + 1, -\frac{\sin 2t}{4} + \frac{t}{2} + 1)$

4. (*4*) Find the unit tangent vector, $\vec{T}$, of $\vec{r}(t) = \langle t, 2\cos t, \sin t\rangle$ at the point $t = 0$.

   $\frac{(1,0,1)}{\sqrt{2}}$

5. (*4*) Find the curvature, κ, of the curve $\vec{r}(t) = \langle t, 2\cos t, \sin t\rangle$ at the point $t = 0$.

   At $t = 0$, $\kappa = \frac{\|\vec{r}'(t)\times\vec{r}''(t)\|}{\|\vec{r}'(t)\|^3} = 1$

END