Test Total

Name _____

Test 1 Honors Calculus III 3450:223:005 Dr. Norfolk September 29, 2006

Show all of your work and explain your reasoning.

1. What kind of triangle has vertices A(1,3,-2), B(3,4,-3) and C(2,1,-3)?

5 points

2. Consider the lines $\frac{x+2}{-2} = \frac{y-3}{4} = \frac{z-1}{2}$ and $x = 3+t, y = 2+t, z = c-t$.

   Find the value of c so that the lines are *not* skew.

10 points

3. Find an equation for the line which is orthogonal to both normals to the planes $x+2y-3z = 9$ and $2x+y+3z = 5$, and passes through (0,0,0).

5 points

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4. Where does the line L : $\mathbf{r} = < 9, -3, -5 > + t < 4, -1, -3 >$ intersect $2x - y + 3z = 6$?

5 points

5. A particle moves with position vector $\mathbf{r} = < t \tan t, 2t, t \sec t >$ for time $0 \leq t < \frac{\pi}{2}$.

(a) By eliminating the parameter t, find the equation of the *quadric surface* on which the particle moves.

5 points

(b) In what *direction* is the particle moving at $t = 0$?

10 points

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6. Given the spherical polar equation $\cos\phi = \rho\sin^2\phi\cos 2\theta$, write a simplified equation in rectangular coordinates.

   Hint : Double-angle formula!

5 points

7. Describe the region given in cylindrical polar coordinates by $0 \leq \theta \leq \dfrac{\pi}{2}$, $r \leq z \leq 1$.

5 points

8. An object starts at position $\mathbf{r}(0) = 3\mathbf{i} + 5\mathbf{j}$, and has velocity $\mathbf{v}(t) = te^t\mathbf{i} + \dfrac{t}{t^2-9}\mathbf{j} + \dfrac{1}{t^2+4}\mathbf{k}$.

   Find the position at time $t = 2$

10 points

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