Math 174 Exam I Name:

1. (10) Determine the angle between the vectors $\mathbf{i} + \mathbf{j} - 2\mathbf{k}$ and $2\mathbf{i} + \mathbf{k}$.

2. (10) Write parametric equations for the line which goes through the origin and is perpendicular to the plane $3x + 2y + z = 5$.

3. (10) Find the angle between the planes $x + z - 2 = 0$ and $y + z + 4 = 0$.

4. (20) Convert the equation $\tan\theta = \tan^2\phi$ given in spherical coordinates to rectangular and cylindrical coordinates.

5. (20) At $t = \ln(\pi/2)$, compute T, N, B, and the osculating plane for the curve $\mathbf{R(t)} = \cos(e^t)\ \mathbf{i} + (1/\sqrt{2})\sin(e^t)\ \mathbf{j} + (1/\sqrt{2})\sin(e^t)\ \mathbf{k}$.

6. (30) For the function $f(x, y, z) = x^{y^z}$ find $\partial f/\partial x$, $\partial f/\partial y$, and $\partial f/\partial z$ at the point (e, e, e).