

Name: _____ ID Number: _____

TA: _____ Section Time: _____

MTH 234
Exam 1: Practice
September 21, 2010
50 minutes
Sects: 12.1-12.6.

No calculators or any other devices allowed.
If any question is not clear, ask for clarification.
No credit will be given for illegible solutions.
If you present different answers for the same problem,
the worst answer will be graded.
Show all your work. *Box your answers.*

1. (20 points) Find the center and the radius of the sphere $x^2 + y^2 + z^2 + 3x - 4y = 0$. Sketch a qualitative picture of the sphere in a Cartesian coordinate system in \mathbb{R}^3 .
2. (10 points) Find the components in a Cartesian coordinate system of a force vector with magnitude $|\mathbf{F}| = 3$ and having an angle $\theta = \pi/3$ with the positive horizontal axis.
3.
 - (a) (5 points) Find a unit vector in the direction of $\mathbf{v} = \langle -1, 2, 1 \rangle$.
 - (b) (5 points) Find the scalar projection of $\mathbf{w} = \langle 1, 2, 1 \rangle$ onto \mathbf{v} .
 - (c) (5 points) Find the vector projection of \mathbf{w} onto \mathbf{v} .
4.
 - (a) (10 points) Find the intersection of the lines
$$\begin{array}{ll} x = t, & x = 2s + 2, \\ y = -t + 2, & y = s + 3, \\ z = t + 1, & z = 5s + 6. \end{array}$$
 - (b) (10 points) Find the equation of the plane determined by these lines.
5.
 - (a) (10 points) Find the cosine of the angle between the planes $2x - 3y + z = 1$ and $-x - 3y + 2z = 5$.
 - (b) (10 points) Find the vector equation of the line of intersection of the two planes given in (a).
6. (15 points) Sketch a graph of the surface $x^2 - y^2 + \frac{z^2}{4} = 0$.