

Mathematics 2110

Print Name: _____

Problem Set

Due Due Monday, September 22, 2008

Signature: _____

Your signature is your pledge that you have adhered to the guidelines for problem sets and take-home examinations.

This problem set will be graded on the basis of 100 points but will be worth 50 points. Make sure that you check the course website for instructions, available from the *General Policies* portion of the web site. Remember that your paper may be handed in before the deadline but that no late papers will be accepted regardless of the reason. The course website also includes an explanation of how your average will be calculated if you fail to complete this assignment.

Note that, since most of the calculations involved can be done routinely using either a calculator or a symbolic manipulation program such as Maple or Mathematica, it will obviously be necessary to show, through your work, exactly how you came up with your solutions.

Each question will be given the same weight.

1. Find vector parametric, scalar parametric and scalar symmetric equations for the line through the points $(5, 3, 1)$ and $(2, 7, 9)$.
2. Find the center and radius of the sphere $x^2 + y^2 + 6y + z^2 = 4x + 8z + 200$.
3. Find the angle between the vectors $\langle 5, 3, 9 \rangle$, $\langle 4, 2, 7 \rangle$.
4. Find the scalar projection of $\langle 5, 3, 9 \rangle$ on $\langle 4, 2, 7 \rangle$.
5. Find the vector projection of $\langle 5, 3, 9 \rangle$ on $\langle 4, 2, 7 \rangle$.
6. Find an equation for the plane containing the points $(0, 1, 2)$, $(1, 2, 3)$ and $(3, 2, 1)$.
7. Find the distance between the point $(2, 3, 4)$ and the plane $2x + 3y + 4z = 5$.

(8-15): Consider the vector function $\mathbf{x} = \langle 2t \cos t, 2t \sin t, t \rangle$.

8. Sketch the graph of \mathbf{x} and describe it in relatively plain language.
9. Find \mathbf{v} and \mathbf{a} .
10. Find \mathbf{T} .
11. Find \mathbf{N} .
12. Find \mathbf{B} .
13. Describe the osculating and normal planes at arbitrary points on the curve.
14. Find the tangential and normal components of \mathbf{a} .
15. Find the curvature κ .

Extra Credit

Extra credit will be awarded for the best joke. All jokes must observe standards of good taste. The determination of the best joke will be made by popular vote in class when the papers are returned.