MATH 255 **Applied Honors Calculus III** **Winter 2005**

Review Sheet for 1st Midterm Exam

Problems from the Textbook:

Section 11.1, pg. 692: 19, 21, 35.
Section 11.2, pg. 702: 31, 53.
Section 11.3, pg. 713: 21, 27.
Section 11.4, pg. 719: 9, 14.
Chapter 11 Review, pg. 732: 1, 15.
Section 13.1, pg. 833: 19, 33.
Section 13.2, pg. 841: 29, 31.
Section 13.3, pg. 848: 1, 11, 26, 39, 45, 49, 53.
Section 13.4, pg. 856: 9, 19, 33, 40, 45.
Section 13.5, pg. 864: 1, 21, 23, 25, 27, 31, 35, 39, 55, 59.
Section 13.7, pg. 878: 9, 21, 23, 49.
Chapter 13 Review, pg. 881: 11, 13, 41, 43.
Section 14.1, pg. 891: 25, 33, 35.
Section 14.2, pg. 897: 21, 29[1], 31.
Section 14.3, pg. 904: 9, 17, 41, 45.
Chapter 14 Review, pg. 918: 17.

Additional Problems:

1. Show that the line segments joining the midpoints of the sides of an arbitrary quadrilateral (taken in order) form a parallelogram.

2. Find to non-parallel vectors which are orthogonal to the vector $\langle a_1, a_2, a_3 \rangle$, where a_1, a_2, and a_3 are real numbers not all zero. Characterize all vectors that are orthogonal to $\langle a_1, a_2, a_3 \rangle$.

3. Find the distance from the origin to the plane $2x + y + z = 3$ and to the line given by the parametric equations $x = 1 + t, y = 2 - t, z = -1 + 2t$.

4. Write the equation $z = x^2 - y^2$ in (1) cylindrical and (2) spherical coordinates.

5. Determine whether the following statements are true or false. Justify your answer.

(a) The line $\langle 1 + t, 1 - t, t \rangle$ intercepts the plane $x + 2y + z = 0$.

(b) If $\mathbf{v}_1 \cdot (\mathbf{v}_2 \times \mathbf{v}_3) = 0$, then $\mathbf{v}_1, \mathbf{v}_2$, and $\mathbf{v}_3$ are in the same plane.

(c) The curve $\langle \sin t, \cos t, t \rangle$ lies on the surface $x^2 + y^2 + z = 1$.

(d) If $\mathbf{v}_1, \mathbf{v}_2$, and $\mathbf{v}_3$ are three dimensional vectors satisfying $\mathbf{v}_1 \cdot \mathbf{v}_2 = 0$ and $\mathbf{v}_1 \cdot \mathbf{v}_3 = 0$, then $\mathbf{v}_2$ and $\mathbf{v}_3$ are parallel.

(e) The lines

$$L_1 : x(t) = 1 + t, \quad y(t) = t, \quad z(t) = 2 - 5t$$
$$L_2 : x(s) = 1 + 2s, \quad y(s) = 2s, \quad z(s) = 2 - 10s$$

are identical.

[1] the definition of smooth curve is in page 894 of the textbook