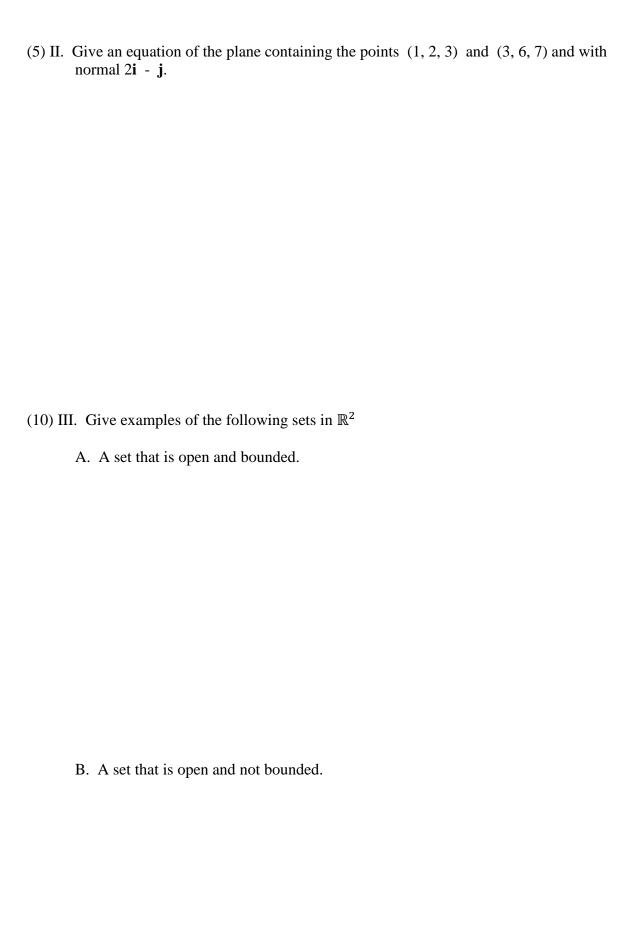
NAME		
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February 5 2010	Mathematics 206 Multivariable Calculus Examination #1	Mr. Haines
(15) I. If $a = i + j$	and $\mathbf{b} = \mathbf{i} - 2\mathbf{j}$ , compute these:	

(15) I. If 
$$\mathbf{a} = \mathbf{i} + \mathbf{j}$$
 and  $\mathbf{b} = \mathbf{i} - 2\mathbf{j}$ , compute these:

B. 
$$\|{\bf b}\| =$$

C. 
$$comp_b a =$$

D. 
$$proj_ba =$$

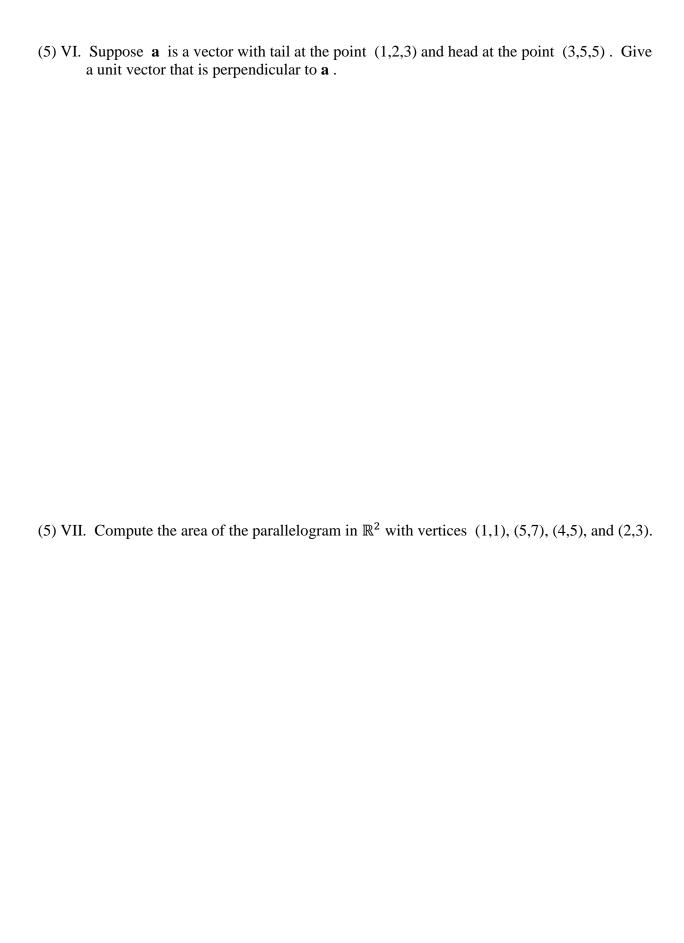


(10) IV.  $\mathbf{A}(t) = \left(1+t, t^2, \frac{1}{t}\right)$  with  $t \ge 1$  is a path in  $\Re^3$ .

A. Calculate A'(t), the derivative of A(t).

B. Give an equation of the tangent line to this path at the point where t = 1.

(5) V. Identify in words the surface whose equation is  $x^2 - y^2 - z^2 - 1 = 0$ 



(5) VIII. The plane P has coordinate equation $2x + 3y + z = 5$ .
Give an equation for any line lying in P:

- (10) IX. Give examples of:
  - A. Two unit vectors in  $\Re^3$  that are perpendicular.

B. Equations of two distinct parallel planes.

 $(15) X. If <math>f(x,y) = x \sin y$ 

A. 
$$\frac{\partial f}{\partial x}(x, y) =$$

B. 
$$\frac{\partial f}{\partial y}(x, y) =$$

C. 
$$\frac{\partial^2 f}{\partial y \partial x}(x, y) =$$

D. 
$$\frac{\partial^2 f}{\partial x \partial y}(x, y) =$$

(10) XI. For the quadratic form

$$p(x, y, z) = -x^2 - 2y^2 - 5z^2 - 2xz,$$

A. Give a symmetric matrix S that is the matrix of this quadratic form.

B. By taking determinants and using Sylvester's Theorem, determine if p is positive definite, negative definite, indefinite, or none of these.

(5) XII. A student says that any three points in  $\mathbb{R}^3$  determine a plane. She wants to find the equation of the plane that contains the points (1, 1, 3), (1, 0, 4), and (1, -1, 5). She knows she needs to find a normal to the plane, but has trouble computing it. Why?