



University of California, San Diego
Department of Mathematics

Instructions

1. Write your *Name*, *PID*, *Section*, and *Exam Version* on the front of your Blue Book.
 2. No calculators or other electronic devices are allowed during this exam.
 3. You may use one page of notes, but no books or other assistance during this exam.
 4. Write your solutions clearly in your Blue Book.
 - (a) Carefully indicate the number and letter of each question and question part.
 - (b) Present your answers in the same order they appear in the exam.
 - (c) Start each problem on a new page.
 5. Show all of your work. No credit will be given for unsupported answers (even if correct).
 6. Turn in your exam paper with your Blue Book.
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0. (1 point) Carefully read and complete the instructions at the top of this exam sheet and any additional instructions written on the chalkboard during the exam.
 1. (6 points) Let A and B be the points with coordinates $A = (1, 3, 3)$ and $B = (2, 1, 2)$.
 - (a) Find a unit vector \vec{u} in the direction of \overrightarrow{AB} .
 - (b) Let $\vec{v} = \vec{i} + \vec{j} - \vec{k}$. Find the coordinates of the point C such that $\overrightarrow{AC} = \vec{v}$.
 - (c) Are the vectors \overrightarrow{AC} and \overrightarrow{AB} orthogonal? Justify your answer.
 2. (6 points) Let A , B , and C be the points with coordinates $A = (2, 0, 0)$, $B = (0, 4, 0)$, and $C = (0, 0, 3)$.
 - (a) Find the equation of the plane passing through the points A , B , and C .
 - (b) Find a vector that is perpendicular to the plane in part (a).
 - (c) Does the vector $\vec{w} = \frac{3}{2}\vec{i} - \frac{2}{3}\vec{j} - 2\vec{k}$ lie in the plane from part (a)?
 3. (6 points) Let $\vec{v} = 2\vec{i} - \vec{j} + 3\vec{k}$ and $\vec{w} = -\vec{i} + \vec{j} + \vec{k}$.
 - (a) Find the vector $\vec{v} \times \vec{w}$.
 - (b) Are \vec{v} and \vec{w} parallel? Justify your answer.
 - (c) Find a unit vector perpendicular to both \vec{v} and \vec{w} .

4. (6 points) Write in your Blue Book the letter of each equation lettered (a)–(f) below. Next to each letter, write the number of the corresponding graph from among the graphs numbered (1)–(9) below. You need not provide any explanation; however, you must clearly list your choices. (*Note:* Yes, there are more graphs than equations.)

$$(a) z = -\frac{1}{x^2 + y^2}$$

$$(c) z = \cos^2 x \cos^2 y$$

$$(e) z = |x| |y|$$

$$(b) z = \sin(y)$$

$$(d) z = \frac{\sin(x^2 + y^2)}{x^2 + y^2}$$

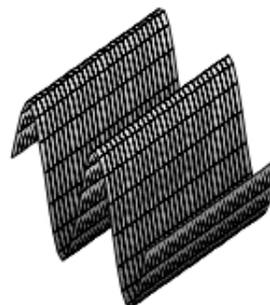
$$(f) z = xye^{-(x^2+y^2)}$$



(1)



(2)



(3)



(4)



(5)



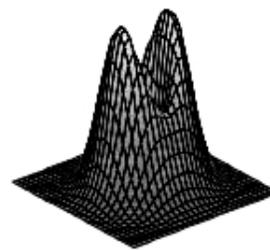
(6)



(7)



(8)



(9)