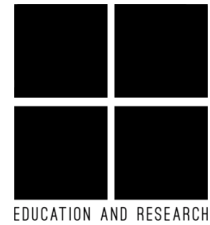




UP SCHOOL OF STATISTICS STUDENT COUNCIL

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MATHEMATICS 54 Third Long Exam

M54_LE3_001
Elementary Analysis II
1st Semester AY 2016-2017

INSTRUCTIONS: Write your answers clearly and legibly. Show ALL necessary solutions and BOX all final answers. Use black or blue pen only. This exam is for 80 minutes only.

- Let S be the quadric surface $x^2 + \frac{y^2}{9} = 1 - z$.
 - Identify the given quadric surface. (1 point)
 - Give the equations and identify the traces of S on the coordinate planes. (3 points)
 - Sketch S . Label its intercepts and the traces obtained in (b). (3 points)
- Consider the points $A(2, 0, 1)$ and $C(-6, 6, 3)$.
 - Find the midpoint B of the line segment joining A and C . (2 points)
 - Give an equation of the sphere centered at C and that passes through B . (3 points)
- Give the equation of the surface generated when the curve $z = \ln(x + 3)$ is revolved about the z -axis. (2 points)
- Do as indicated.
 - Let $\vec{v} = \langle 8\sqrt{5}, 2\sqrt{5}, \sqrt{15} \rangle$ and $\vec{w} = \left\langle -\frac{1}{\sqrt{5}}, \frac{1}{\sqrt{5}}, \frac{\sqrt{3}}{\sqrt{5}} \right\rangle$. Find the magnitude of $proj_{\vec{w}}\vec{v}$. (3 points)
 - Use scalar triple product to find the volume of the parallelepiped with $\vec{v} = \langle 0, -2, 3 \rangle$, $\vec{w} = \langle 3, 1, 3 \rangle$, and $\vec{v} \times \vec{w}$ as adjacent edges. (3 points)
- Let $\ell_1 : x + 2 = 5 - y = z - 2$ and $\ell_2 : \begin{cases} x = -3 + 2t \\ y = 4 \\ z = 6 - 3t \end{cases}$
 - Find the point of intersection of ℓ_1 and ℓ_2 . (4 points)
 - Find the equation of the plane π containing both ℓ_1 and ℓ_2 . (3 points)
 - Find the distance between plane π and the point $(0, 6, 1)$. (2 points)
- Determine whether the following statements are true or false. Write TRUE if the given statement is true. Otherwise, write FALSE. Show all necessary solutions to justify your answer. (2 points each)
 - Consider the vectors $\vec{u} = \langle -18, -7, 17 \rangle$, $\vec{v} = \langle 4, 3, -3 \rangle$, and $\vec{w} = \langle -3, 1, 4 \rangle$. Then there is a nonzero vector \vec{x} satisfying the equation

$$\vec{u} + 3\vec{v} - 2(\vec{x} + \vec{w}) = \vec{0}$$
 - If \vec{v} and \vec{w} are nonzero vectors in 3-space that are perpendicular to each other then $\frac{\vec{v} \times \vec{w}}{\|\vec{v}\|\|\vec{w}\|}$ must be a unit vector.

(c) There is a vector of length 6 such that the value of its direction cosines are $\frac{1}{6}$, $\frac{1}{3}$, and $\frac{1}{2}$.

***** END OF EXAM *****

Total: 35 points