

MAC2313
Calculus III
Final Examination Topic Outline

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1. Determine the distance between two points in 3-space
2. Determine the equation of a sphere given its center & radius
3. Describe a surface from a given equation
4. Construct a vector in 2- or 3-space
5. Perform operations on vectors utilizing given relationships
6. Determine the magnitude of a vector
7. Unitize (a.k.a. normalize) a given vector
8. Determine the resultant of and/or the angle between two forces/vectors
9. Find the dot product of two vectors
10. Find the angle between two vectors using the dot product
11. Find the direction cosines of given vectors
12. Determine the projection of one vector onto another vector
13. Determine the vector component of a vector orthogonal to another vector
14. Determine the displacement vector
15. Determine the work done by a vector force
16. Determine the cross product of given vectors
17. Determine the area of a parallelogram
18. Determine the triple scalar product of three vectors
19. Determine the volume of a parallelepiped
20. Determine the torque and/or torque vector of a force F about a point P .
21. Determine the parametric equation of a line in 2- or 3-space satisfying stated conditions
22. Know the definition and significance of skew lines
23. Determine the of the equation of a plane given conditions [this includes parametric and symmetric forms]
24. Determine the acute angle of intersection between two intersecting planes
25. Determine the equation of a line of intersection between two planes
26. Determine the distance between a point and a plane
27. Identify the type and/or sketch the graph of a given quadric surface
28. Convert between rectangular, cylindrical, and spherical coordinates
29. Convert a given equation between rectangular, cylindrical, and spherical forms
30. Describe the region in 3-space that satisfies given inequalities

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31. Identify the component form of a vector-valued function
32. Determine the domain of a vector-valued function
33. Determine the continuity and/or differentiability of a vector-valued function
34. Differentiate/integrate vector-valued functions
35. Determine the arc length of a vector-valued function
36. Determine an arc length parameterization of a vector-valued function
37. Find the unit tangent vector, unit normal vector, and the binormal vector
38. Find equations for the rectifying, osculating, & normal planes for a given vector-valued function
39. Find the curvature κ and the radius of curvature ρ
40. Determine the smooth transition between two smooth curves
41. Determine the velocity, acceleration, and speed of a given vector-valued function
42. Determine the distance and displacement over a given interval for a given vector-valued function
43. Determine the tangential scalar component, the normal scalar component, the tangential vector component, and the normal vector component
44. Determine projectile motion
45. Find the position and velocity vectors from given information

