

Formula Quiz Math 213 Multi-Variable Calculus

Name _____

1. length of a vector in Space _____
2. 2 dimensional dot product $\mathbf{u} \cdot \mathbf{v} =$ _____
3. 3 dimensional dot product $\mathbf{u} \cdot \mathbf{v} =$ _____
4. Angle between two vectors _____
5. Cross product $\mathbf{u} \times \mathbf{v} =$ _____
6. parametric form equations of a line in space _____
7. symmetric form of the equations of a line in space _____
8. Standard equation of a plane in Space _____
9. general form of the equation of a plane in Space _____
10. Cartesian (rectangular) to cylindrical: $x =$ _____ $y =$ _____ $z =$ _____
11. Cartesian (rectangular) to cylindrical $r^2 =$ _____ $\tan \theta =$ _____ $z =$ _____
14. Total differential: _____
15. Chain rule one independent variable _____
16. Chain rule two independent variables _____
17. Chain rule implicit differentiation _____
19. Directional Derivative _____
20. Gradient of $f(x,y)$
 $\nabla f(x,y) =$ _____

21. Second Partial Test

f must have continuous second derivatives on an open region containing point (a,b) for which

$f_x(a,b) = \underline{\hspace{2cm}}$ $f_y(a,b) = \underline{\hspace{2cm}}$

To test for extrema consider the quantity: $d = \underline{\hspace{4cm}}$

1. if $d > 0$ and $f_{xx}(a,b) > 0$, then f has a $\underline{\hspace{2cm}}$ at (a,b)
2. if $d > 0$ and $f_{xx}(a,b) < 0$, then f has a $\underline{\hspace{2cm}}$ at (a,b)
3. if $d < 0$ then $(a,b,f(a,b))$ is a $\underline{\hspace{2cm}}$
4. the test is inconclusive if $d = \underline{\hspace{2cm}}$

22. Ellipse $\underline{\hspace{4cm}}$

23. Ellipsoid $\underline{\hspace{4cm}}$

24. Hyperbola $\underline{\hspace{4cm}}$

25. Hyperboloid of one sheet $\underline{\hspace{4cm}}$

26. Hyperboloid of two sheets $\underline{\hspace{4cm}}$

27. Elliptic cone $\underline{\hspace{4cm}}$

28. Elliptic Paraboloid $\underline{\hspace{4cm}}$

29. Hyperbolic paraboloid $\underline{\hspace{4cm}}$

30. If \mathbf{u} and \mathbf{v} are non zero vectors, then the projection of \mathbf{u} onto \mathbf{v} is given by

$\underline{\hspace{4cm}}$

31. The distance between a plane and a point Q (not in the plane) is given by $D =$

$\underline{\hspace{4cm}}$

32. The distance between a point Q and a line in space is given by $D =$

33. How can gradients be used to find a directional derivative? $\underline{\hspace{4cm}}$

34. What is Lagrange's Theorem? $\underline{\hspace{4cm}}$

Bonus: What is the formula for least squares regression for a line?

Write the answers to the following common derivatives (different with respect to x)

35 $\arctan x$ _____

36 $\operatorname{arcsec} x$ _____

37 $\operatorname{arccot} x$ _____

38 $\operatorname{arccsc} x$ _____

39 the formula for integration by parts is: _____

40 the slope of a parameterized curve is: _____