Review

Math 1920 - Andres Fernandez

Name: _____

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Problems

(1) Find the maxima/minima of the function $f(x, y, z) = 3x + 4y + 3$ subject to the constraint $x^2 + 4y^2 + 5z^2 = 1$.

(2) Find the maximum of the function $f(x, y) = y^2 + xy - x^2$ on the region given by $0 \leq x \leq 2$ and $0 \leq y \leq 2$.

(3) Find the critical points of the function $f(x, y) = x^4 + xy + y^2$, and use the second derivative test to determine the nature of said points.

(4) Use cylindrical coordinates to set up the integral of a random function $f(x, y, z)$ over the the sphere of radius 2.

(5) Calculate the integral of $f(x, y, z) = \sqrt{x^2 + y^2 + z^2}$ over the region given by $x^2 + y^2 + z^2 \leq 2z$.

(6) Compute the work done by the force $\mathbf{F} = \langle 1, 1, 1 \rangle$ along the path formed the semicircle from (3, 0) to (-3, 0) counterclockwise plus the straight interval from (-3, 0) to (3, 0). Why does you answer make sense?