MATH 259 – QUIZ 4 – SPRING 2019 || 25 POINTS || 20 MINUTES

Instructions: Show all work. No collaboration or references.
No computational devices allowed without instructor permission.

Print Name _____

1. (6 pts) Calculate the differential of volume for a cylindrical can with end caps: $V = \pi r^2 h$. Estimate the change in volume for a can with radius 2 inches and height 10 inches if the radius is increased by 0.1 in and the height decreased by 0.1 in.

2. (5 pts) Find the derivative of $f(x, y) = x^2 y + xy^3$ at the point $(2, 1)$ in direction $\langle -1, 1 \rangle$.

3. (4 pts) Use the chain rule to find $\dfrac{\partial z}{\partial t}$ for $z = e^{-x^2}\sin(y)$ where $x = s^2 t$ and $y = s + t^3$.

4. (6 pts) Find the equation of the tangent plane to the surface given by $f(x, y) = x^2 y + xy^3$ at the point $(2, 1)$.

5. (4 pts) Find all critical points and local extrema of $f(x, y) = x^2 + y^2 - xy$.
(Note: Part of the formulas for the second derivative are given.)
$D = f_{xx} f_{yy} - (f_{xy})^2$
$D > 0$ _____
$D > 0$ _____
$D < 0$ _____