Math 250B
Assignment 2

Covers: Sections 12.8-12.10, 13.1-13.3
Due: Mon Oct 20 at 11:30am

INSTRUCTIONS:
This assignment will be marked for completion.
Solutions will be posted on the course website 24 hours after the deadline.
You may not copy the work of another person or AI.
Submit jpg or pdf files to the D2L Dropbox.

1. Find a tangent vector to the intersection of $x^2 + y^2 - 5z = 0$ and $x^2 + y^2 + z^2 = 50$ at the point $(4, -3, 5)$.

2. Use Lagrange Multipliers to maximize $f = 8xyz$ subject to $x^2 + \frac{y^2}{4} + \frac{z^2}{16} = 48$. Assume all variables are positive. State the maximum value of f and the point (x, y, z) where it occurs.

3. a) The function $f = -3\ln x + 12x + \frac{1}{y} + 9y$ has one critical point that satisfies $x > 0$ and $y > 0$. Find it.
b) Is this critical point a local maximum, a local minimum, a saddle point, or can you not determine?

4. Evaluate $\int_0^{\frac{\pi}{2}} \int_0^3 (r\sqrt{9 - r^2} + \sin\theta)\ \ dr\ d\theta$

5. Set up a double integral using **horizontal slices** for the volume between $z = x + 3$ and $z = 10$, over the region bounded by $x = y^2$ and $y = x/2$.
Do not evaluate.