Math 2313, Final

Name _____

1. Find parametric equations for the line of intersection of the planes $x - 2z = 1$ and $y + 2z = 3$.

   answer: $x = 1 + 2t, y = 3 - 2t, z = t$

2. Find parametric equations for the tangent line to $r(t) =< t^2, t^3, t^4 >$ at $t = -1$.

   answer: $x = 1 - 2t, y = -1 + 3t, z = 1 - 4t$

3. Find $\frac{\partial U}{\partial p}$ at $x = 1, y = 1, z = 0$, if $U = x^3 + ln(xy) + e^{3yz}$, and $\frac{\partial x}{\partial p} = 1, \frac{\partial y}{\partial p} = 3, \frac{\partial z}{\partial p} = 2$.

   answer: 13

4. Evaluate $\int_0^1 \int_{2x}^2 cos(y^2) dy dx$. (Hint: switch the order of integration.)

   answer: $\frac{1}{4} sin(4)$

5. Find the directional derivative of $f(x, y, z) = x^3 + ln(xy) + e^{3yz}$ at the point $(1, 1, 0)$ in the direction of the vector $< 3, 4, 12 >$.

answer: 4

6. Find the point on the surface $z = \sqrt{1 - 2x - 2y}$ closest to the point $(-2, -2, 0)$.

answer: $(-1, -1, \sqrt{5})$

7. Find the centroid of the hemisphere $x^2 + y^2 + z^2 \leq 1, z \geq 0$. (Hint: $\bar{x}$ and $\bar{y}$ are obvious, only $\bar{z}$ is not. Also, the volume of a sphere of radius a is $\frac{4}{3}\pi a^3$.)

answer: $(0, 0, 0.375)$