Midterm 2 / 2004.11.29 / Calculus for Applications / MAT 3243

Name: _____

Please show all work and justify your statements. Label sketches, draw conclusions using complete sentences including units, and box your final answers as appropriate.

1. A solid is bounded by the coordinate planes and the plane $2x + 3y + z = 6$. Its mass is the integral of the density $10 + x + y$ over the solid. Set up, but do not evaluate, the iterated integral for the mass with the order of integration $z, y, x$.

2. Integrate $y\,dx$ along the straight line segment from $(1, 1)$ to $(5, 3)$. Had we chosen a different path from $(1, 1)$ to $(5, 3)$, would the integral remain the same? Explain.

3. Find an equation and a parametric formula for the plane tangent to the surface $[s^2t, st^2, s + t]$ at $[-4, 2, 1]$.

4. Compute the flux of $\mathbf{F} = [(x - 1)^2y^2, y, z]$ through the unit disc in the $y$-$z$ plane.

5. Let $\omega = e^{xy}$ and $\eta = x\,dy + y\,dz$. Find and simplify $d\omega \wedge \eta$ and $d\omega \wedge d\eta$.

| 1 | 2 | 3 | 4 | 5 | total (50) | % |
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Prelim. course grade: %