MATH222 ASSIGNMENT 7
DUE FRIDAY NOV. 23, 2007

1. Compute double integral $\int\int_D xdA$ where D is the finite region bounded by $y = 2x^2$ and $y = 1 + x^2$.

2. Compute double integral $\int\int_D (x^2 + y^2)dA$ where D is the finite region between $y = x$ and $y = x^2$. Integrate with respect to x first.

3. By reversing the order of integration evaluate

$$\int_0^9 \int_{\sqrt{y}}^3 \sin \pi x^3 dxdy.$$

4. Evaluate $\int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_{(x^2+y^2)^2}^1 x^2 dzdydx$.

5. Evaluate using polar coordinates: $\int_D ydA$, if D is the region in the first quadrant bounded by the circle $x^2 + y^2 = 9$ and the lines $y = 0$ and $y = x$.

6. Let Ω be the solid region bounded above by the plane $y + z = 4$, below by the xy plane and on the sides by the cylinder $x^2 + y^2 = 16$. Evaluate

$$\int_\Omega \sqrt{x^2 + y^2} dV$$

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7. Let $f(x, y) = 4x^2 - 3y^2 + 2xy$, show that $f(x, y)$ does not have a local max or local min anywhere in the plane. Does it have a saddle point? (Justify your answer.) Find the max and min of $f(x, y)$ on the square $\{(x, y)|0 \leq x \leq 1, 0 \leq y \leq 1\}$, naming the points at which these extrema occur.

8. Use the method of Lagrange multipliers (or otherwise) to find maxima and minima of $f(x, y, z) = x^2 + y^2 + z^2$ on the ellipse formed by intersection of the cone $z^2 = x^2 + y^2$ by the plane $x - 2z = 3$.