Math 263A - Quiz # 4 - Wi09(OSU) Name: Kwa, Kiam Heong.

February 12, 2009 Signature:

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Instructions. The point value of each problem is indicated in square brackets. To obtain full credit, you must have the correct answers along with relevant supporting work to justify them. Partial credit will be given based on the work that is shown. However, **answers without supporting work will receive no credit.**

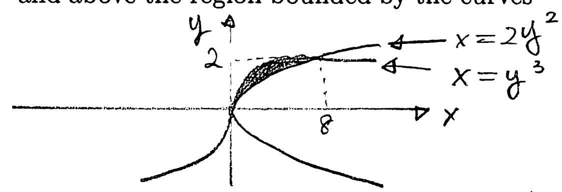
Problem 1. Set up (but do **not** evaluate) a double integral that represents the volume of each of the following regions.

(a) The solid that lies under the surface $z = 2x + y^2$ and above the region bounded by the curves $x = 2y^2$ and $x = y^3$. [5pts]

$$\int_0^2 \int_{y^3}^{2y^2} (2x+y^2)\, dx\, dy$$

or

$$\int_0^8 \int_{\sqrt{\frac{x}{2}}}^{\sqrt[3]{x}} (2x+y^2)\, dy\, dx$$



$x=2y^2$ and $x=y^3$ intersect when $2y^2=y^3$; So $y=0, x=0$ or $y=2, x=8$.

(b) The solid bounded by the paraboloids $z = 3x^2 + 3y^2$ and $z = 8 - x^2 - y^2$ in the first octant. Use polar coordinates. [6pts]

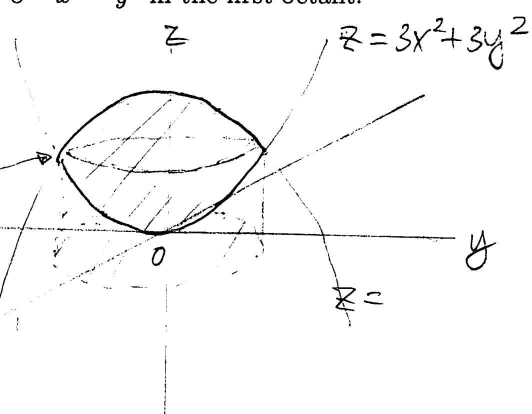
$$\int_0^{\frac{\pi}{2}} \int_0^{\sqrt{2}} (8-x^2-y^2)-(3x^2+3y^2)\, r\, dr\, d\theta$$

$$= \int_0^{\frac{\pi}{2}} \int_0^{\sqrt{2}} (8-4r^2)\, r\, dr\, d\theta$$

intersection of $z=3x^2+3y^2$ and $z=8-x^2-y^2$

$(x^2+y^2=2)$

$r=\sqrt{2}$



Problem 2. Reverse the order of integration for

$$\int_0^8 \int_{\sqrt[3]{y}}^2 f(x,y)\, dx\, dy,$$

where f is a continuous function. Do **not** evaluate the integral. [4pts]

$$\int_0^2 \int_0^{x^3} f(x,y)\, dy\, dx$$