

Math 173 - Quiz 8

April 21, 2011

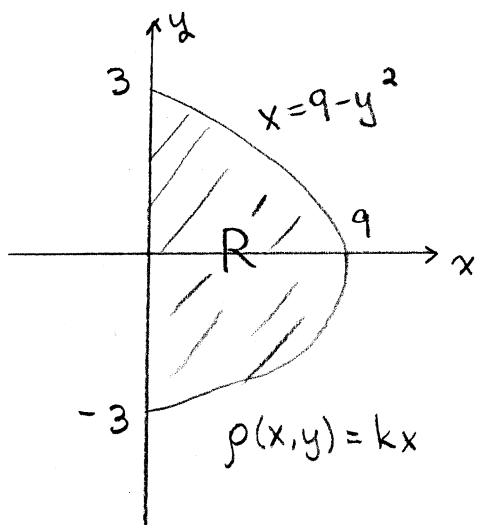
Name key Score _____

Show each step to receive full credit. Supply explanations when necessary.

1. (2.5 points) Problem #46, page 1010

$$\begin{aligned}
 \int_{\theta=0}^{2\pi} \int_{r=0}^{2+\sin\theta} r \, dr \, d\theta &= \frac{1}{2} \int_0^{2\pi} (2+\sin\theta)^2 \, d\theta = \frac{1}{2} \int_0^{2\pi} (4 + 4\sin\theta + \sin^2\theta) \, d\theta \\
 &= \int_0^{2\pi} 2 \, d\theta + \int_0^{2\pi} 2\sin\theta \, d\theta + \int_0^{2\pi} \left(\frac{1}{4} - \frac{1}{4}\cos 2\theta\right) \, d\theta \quad \text{Power Reducing Formula} \\
 &= 4\pi + 0 + \frac{\pi}{2} = \boxed{\frac{9\pi}{2}}
 \end{aligned}$$

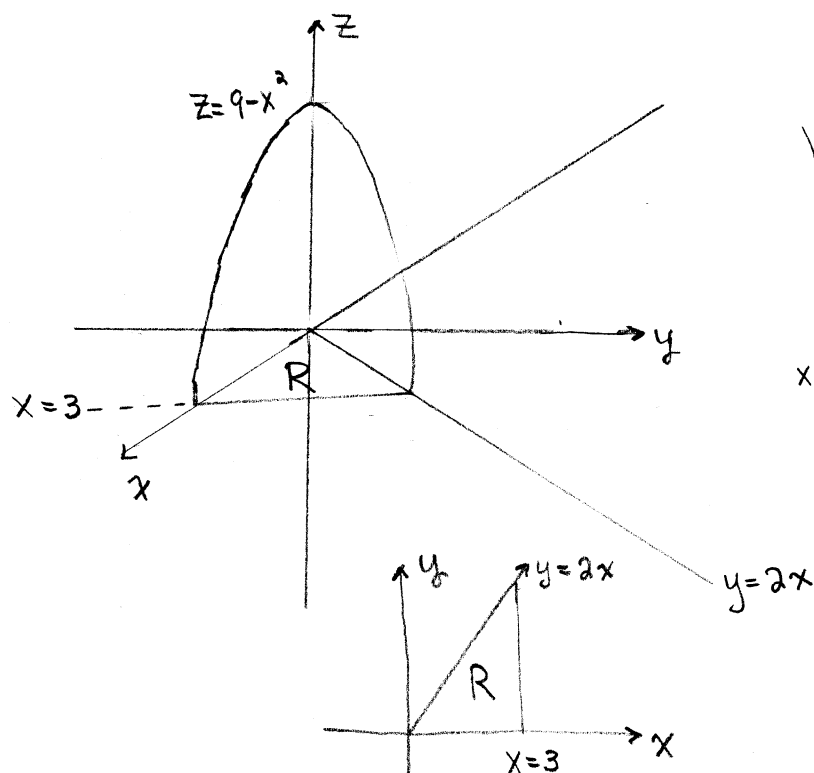
2. (2.5 points) Problem #18, page 1018



$$\begin{aligned}
 \text{Mass} &= \int_{-3}^3 \int_0^{9-y^2} kx \, dx \, dy = \frac{648k}{5} \\
 M_y &= \int_{-3}^3 \int_0^{9-y^2} kx^2 \, dx \, dy = \frac{23328k}{35} \\
 M_x &= \int_{-3}^3 \int_0^{9-y^2} kxy \, dx \, dy = 0
 \end{aligned}$$

Center of Mass : $\boxed{\left(\frac{36}{7}, 0\right)}$

3. (2.5 points) Problem #14, page 1035



$$\text{Volume} = \int_{x=0}^{x=3} \int_{y=0}^{y=2x} \int_{z=0}^{z=9-x^2} dz dy dx$$

4. (2.5 points) Problem #22, page 1035

$$\text{Volume} = \int_{x=-6}^{x=6} \int_{y=-\sqrt{36-x^2}}^{y=\sqrt{36-x^2}} \int_{z=0}^{z=36-x^2-y^2} dz dy dx$$

OR, USING POLAR/CYLINDRICAL COORDS ---

$$\int_{\theta=0}^{\theta=2\pi} \int_{r=0}^{r=6} \int_{z=0}^{z=36-r^2} r dz dr d\theta = \boxed{648\pi}$$