MTH 207 – Calculus I
Quiz 8
November 21, 2008

Name: _____
Section: _____

1. (5 points) Evaluate the integral:

$$\int \frac{x^3 - 2\sqrt{x}}{x}\,dx$$

$= \int \frac{x^3}{x} - \frac{2x^{1/2}}{x}\,dx$

$= \int x^2 - 2x^{-1/2}\,dx$

$= \frac{1}{3}x^3 - 4x^{1/2} + C$

2. (5 points) Evaluate the integral:

$$\int_0^{\sqrt{\pi}} x \cdot \cos(x^2)\,dx$$

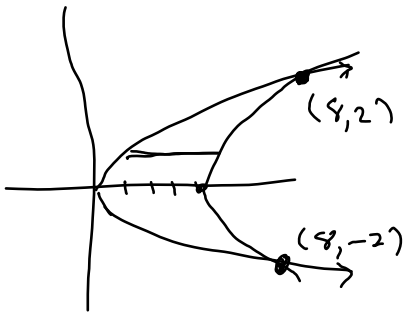
Let $u = x^2$ $\quad x=0 \to u=0$

$du = 2x\,dx$ $\quad x=\sqrt{\pi} \to u=\pi$

$$\int_{u=0}^{u=\pi} x\cos(u)\frac{du}{2x} = \int_0^{\pi} \frac{1}{2}\cos u\,du = \frac{1}{2}\sin u\Big|_0^{\pi} = \frac{1}{2}(\sin\pi - \sin 0)$$

$= 0$

3. (5 points) Find the area of the region bounded by the curves $x = 2y^2$ and $x = 4 + y^2$.



Solve $2y^2 = 4 + y^2$

$y^2 = 4$

$y = \pm 2$

$$A = \int_{-2}^{2} (4 + y^2) - 2y^2\,dy$$

$$= \int_{-2}^{2} 4 - y^2\,dy$$

$$= 2\int_0^2 4 - y^2\,dy \quad \text{(by symmetry)}$$

$$= 2\left(4y - \frac{y^3}{3}\right)\Big|_0^2 = 2\left(8 - \frac{8}{3}\right) = \frac{32}{3}$$