

Name _____

MATH-1952

Quiz 3 - (5.5,6.1)

Answer the following questions, and show your work. Scientific calculator only.

[1] (8 points total) Evaluate the integrals.

$$(a) \quad (3 \text{ pts}) \quad \int \cos x \sin(\sin x) dx = \int \sin u du = -\cos u + C$$
$$= -\cos(\sin x) + C$$

$$u = \sin x$$

$$du = \cos x dx$$

$$(b) \quad (3 \text{ pts}) \quad \int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx = \int e^{\sqrt{x}} \cdot \frac{1}{\sqrt{x}} dx = 2 \int e^u du = 2e^u + C$$
$$= 2e^{\sqrt{x}} + C$$

$$u = \sqrt{x} = x^{1/2}$$

$$du = \frac{1}{2} x^{-1/2} dx$$

$$= \frac{1}{2\sqrt{x}} dx$$

$$2 du = \frac{1}{\sqrt{x}} dx$$

$$(c) \quad (2 \text{ pts}) \quad \int_0^2 x(x^2 - 2)^3 dx = \frac{1}{2} \int_{-2}^2 u^3 du = \frac{1}{2} \left(\frac{u^4}{4} \Big|_{-2}^2 \right)$$

$$u = x^2 - 2$$

$$du = 2x dx$$

$$\frac{1}{2} du = x dx$$

$$u(0) = 0^2 - 2 = -2$$

$$u(2) = 2^2 - 2 = 2$$

$$= \frac{1}{2} \left(\frac{16}{4} - \frac{(-2)^4}{4} \right)$$

$$= \frac{1}{2} \left(4 - \frac{16}{4} \right)$$

$$= \frac{1}{2} \cdot 0 = 0$$

[2] (2 points) Find the area between the curves $y = 1$, $y = x^2$ for $-1 \leq x \leq 1$.

$$1 = x^2$$

$$\Rightarrow x = \pm 1$$

$$\text{at } x = 0$$

$$y = 1$$

$$y = 0^2 = 0$$

 \Rightarrow
 $S_0,$

$$\int_{-1}^1 1 - x^2 dx$$

$y = 1$

is above
 $y = x^2$

$$= x - \frac{x^3}{3} \Big|_{-1}^1$$

$$= \left(1 - \frac{1^3}{3}\right) - \left(-1 - \frac{(-1)^3}{3}\right)$$

$$= \left(1 - \frac{1}{3}\right) - \left(-1 + \frac{1}{3}\right)$$

$$= 1 - \frac{1}{3} + 1 - \frac{1}{3}$$

$$= 2 - \frac{2}{3} = \frac{4}{3}$$