

NAME: SOLUTIONS

QUIZ 11

Dawson College

Course Code: 201-NYA-05 S07

Date: April 30th 2010

Instructor: E. Richer

Question 1. (5 marks each)

Evaluate the following definite integrals.

$$\begin{aligned} \text{(a)} \quad & \int_2^3 \frac{x^2+1}{(x^3+3x)^2} dx && u = x^3+3x \\ & && du = 3x^2+3 dx \\ & = \int_{14}^{33} \frac{1}{3} \frac{1}{u^2} du && \frac{1}{3} du = x^2+1 dx \\ & = \int_{14}^{33} \frac{1}{3} u^{-2} du && x=3 \quad u=36 \\ & && x=2 \quad u=14 \\ & = -\frac{1}{3} u^{-1} \Big|_{14}^{33} \\ & = -\frac{1}{3} \left(\frac{1}{36} \right) + \frac{1}{3} \left(\frac{1}{14} \right) = \boxed{11/756} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & \int_{\pi/6}^{\pi/2} \frac{2\cos(2x)}{1+\sin^2(2x)} dx && u = \sin 2x \\ & && du = 2\cos 2x dx \\ & = \int_{\sqrt{3}/2}^0 \frac{1}{1+u^2} du && x = \pi/2 \quad u = \sin \pi = 0 \\ & && x = \pi/6 \quad u = \sin \pi/3 = \sqrt{3}/2 \\ & = \text{Arctan } u \Big|_{\sqrt{3}/2}^0 \\ & = \boxed{-\text{Arctan}(\sqrt{3}/2)} \end{aligned}$$

$$(c) \int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$$

$$= \int_1^2 2e^u du$$

$$= 2e^u \Big|_1^2$$

$$= 2e^2 - 2e$$

$$= \boxed{2e(e-1)}$$

$$u = \sqrt{x}$$

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

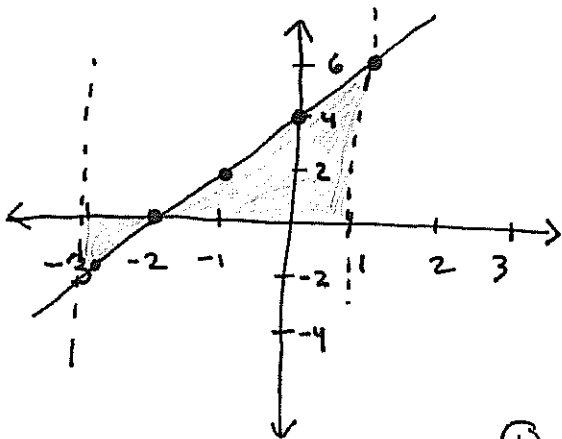
$$2 du = \frac{1}{\sqrt{x}} dx$$

$$x=4 \quad u=2$$

$$x=1 \quad u=1$$

(Question 2.) (5 marks)

Find the area bounded by the line $y = 2x + 4$, the x -axis and the lines $x = -3$ and $x = 1$. Your work must be accompanied by a sketch of the bounded area.



AREA :

$$\int_{-3}^{-2} 2x + 4 dx$$

$$= x^2 + 4x \Big|_{-3}^{-2}$$

$$\textcircled{1} = (4 - 8) - (9 - 12)$$

$$= -4 - (-3) = -1$$

$$\textcircled{2} \int_{-2}^1 2x + 4 dx$$

$$= x^2 + 4x \Big|_{-2}^1$$

$$= 5 - (-4) = 9$$

TOTAL AREA IS $\boxed{10 \text{ SQUARE UNITS}}$