Dawson College: **Calculus II**: 201-NYB-05-S1: Summer 2008

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Quiz 2

This quiz is graded out of 10 marks. No books, graphing calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(5 marks)* Use the Trapezoidal Rule with $n = 4$ to approximate the value of the definite integral and compare your answer to the actual value of the integral. *(i.e. Also calculate the definite integral using the Fundamental Theorem of Calculus.)*

$$\int_1^2 \frac{1}{(x+1)^2}\,dx$$

$$\Delta x = \frac{b-a}{n} = \frac{2-1}{4} = \frac{1}{4}$$

$x_0 = 1$, $x_1 = a + \Delta x = 5/4$, $x_2 = a + 2\Delta x = 6/4$, $x_3 = a + 3\Delta x = 7/4$, $x_4 = 2$

$$\approx \frac{b-a}{2n}\left[f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + f(x_4)\right]$$

$$= \frac{2-1}{2(4)}\left[f(1) + 2f(5/4) + 2f(6/4) + 2f(7/4) + f(2)\right]$$

$$= \frac{1}{8}\left[\frac{1}{(1+1)^2} + 2\frac{1}{(5/4+1)^2} + 2\frac{1}{(6/4+1)^2} + 2\frac{1}{(7/4+1)^2} + \frac{1}{(2+1)^2}\right]$$

$$= \frac{1}{8}\left[\frac{1}{4} + \frac{2}{(9/4)^2} + \frac{2}{(5/2)^2} + \frac{2}{(11/4)^2} + \frac{1}{9}\right]$$

$$\doteq 0.1676$$

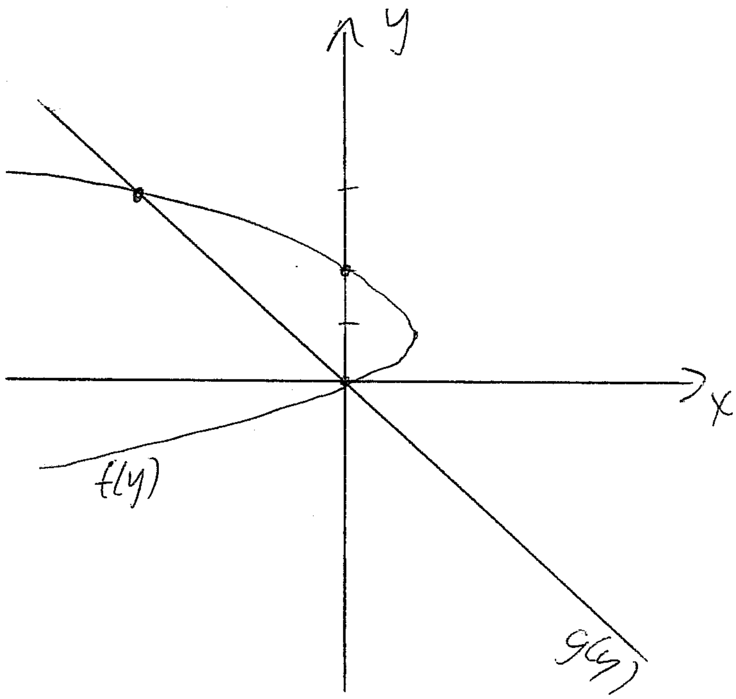
$$\int_1^2 \frac{1}{(x+1)^2}\,dx$$

$u = x+1$
$du = dx$
$u(1) = 1+1 = 2$
$u(2) = 2+1 = 3$

$$= \int_2^3 \frac{1}{u^2}\,du$$

$$= \left[\frac{-1}{u}\right]_2^3 = \frac{-1}{3} + \frac{1}{2} = \frac{1}{6}$$

Question 2. *(5 marks)* Sketch the region bounded by the graphs of the algebraic functions $f(y) = y(2-y)$ and $g(y) = -y$ and find the area of the region.



Lets find the intersection of the two curves.

$$f(y) = g(y)$$
$$2y - y^2 = -y$$
$$3y - y^2 = 0$$
$$y(3-y) = 0$$

$\therefore$ intersection at $y=0$ and $y=3$

$$\text{Area} = \int_0^3 f(y) - g(y)\, dy$$
$$= \int_0^3 2y - y^2 + y \, dy$$
$$= \int_0^3 3y - y^2 dy$$
$$= \left[\frac{3y^2}{2} - \frac{y^3}{3}\right]_0^3$$
$$= \left[\frac{3(3)^2}{2} - \frac{3^3}{3}\right]$$
$$= \left[\frac{27}{2} - 9\right]$$
$$= \frac{9}{2}$$