Dawson College: **Calculus II**: 201-NYB-05-C1: Winter 2008

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Quiz 5

This quiz is graded out of 10 marks. No books, 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. §7.1#35 (6 marks)
Find the area bounded by the two curve $y = x^2 - 4x + 3$ and $y = 3 + 4x - x^2$ and give a graph of both curves.

First we find where both curves intersect: $x^2 - 4x + 3 = 3 + 4x - x^2$

$2x^2 - 8x = 0 \Rightarrow x = 0, 4$ ← the curves intersect at

Do the curves cross the x-axis ? yes

$0 = x^2 - 4x + 3 = (x-3)(x-1)$
$0 = 3 + 4x - x^2$ $\quad x = \frac{-4 \pm \sqrt{(4)^2 - 4(3)(1)}}{-2} = 2 \pm \sqrt{7}$

The vertex of the two quadratic

$y = x^2 - 4x + 3 = x^2 - 4x + 4 - 4 + 3 = (x-2)^2 - 1$ ∴ vertex at $(2, -1)$

$y = 3 + 4x - x^2 = -[x^2 - 4x - 3] = -[x^2 - 4x + 4 - 4 - 3] = -(x-2)^2 + 7$ ∴ vertex at $(2, 7)$

$$\text{Area} = \int_0^4 (3 + 4x - x^2) - (x^2 - 4x + 3)\,dx = \int_0^4 8x - 2x^2\,dx$$

$$= 4x^2 - \frac{2}{3}x^3 \Big|_0^4$$

$$= 4(4)^2 - \frac{2(4)^3}{3}$$

$$= 64 - \frac{128}{3}$$

$$= \frac{64}{3}$$

Question 2. §8.1#11 (4 marks)
Integrate the following indefinite integral using integration by parts:

$\int xe^{-2x}\,dx$ $\quad \int u\,dv = uv - \int v\,du$

Let $u = x \Rightarrow du = dx$

$v = -\frac{e^{-2x}}{2} \Leftarrow dv = e^{-2x}\,dx$

$$= -\frac{xe^{-2x}}{2} - \int -\frac{e^{-2x}}{2}\,dx$$

$$= -\frac{xe^{-2x}}{2} - \frac{e^{-2x}}{4} + C$$

Bonus. (1 mark)
List the three trigonometric identities given last class.

$\sin^2 x + \cos^2 x = 1$

$\cot^2 x = \csc^2 x - 1$

$\tan^2 x = \sec^2 x - 1$