Dawson College: Calculus II (SCIENCE): 201-NYB-05-S4: Winter 2011

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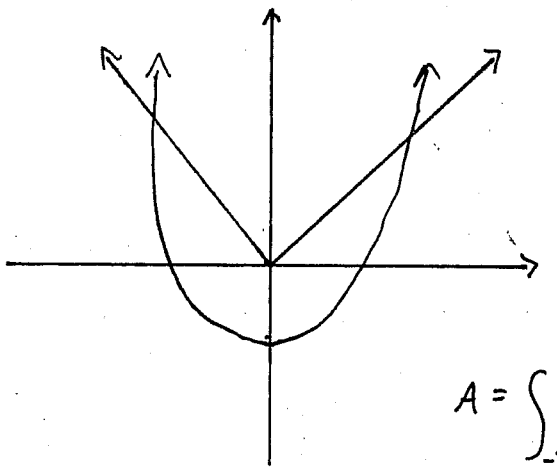
Quiz 8

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. *(5 marks)* §7.1 #14
Sketch the region enclosed by the given curves. Then find the area of the region.

$y = |x|$, $y = x^2 - 2$



If $x \geq 0$ then $y = x$ and the intersection is at

$$x = x^2 - 2$$
$$0 = x^2 - x - 2$$
$$0 = (x-2)(x+1)$$
$$x = 2 \qquad x = -1$$

Similarly if $x \leq 0$ then $y = -x$ and the intersection is at $x = -2$

$$A = \int_{-2}^{0} -x - [x^2 - 2]\,dx + \int_{0}^{2} x - [x^2 - 2]\,dx$$

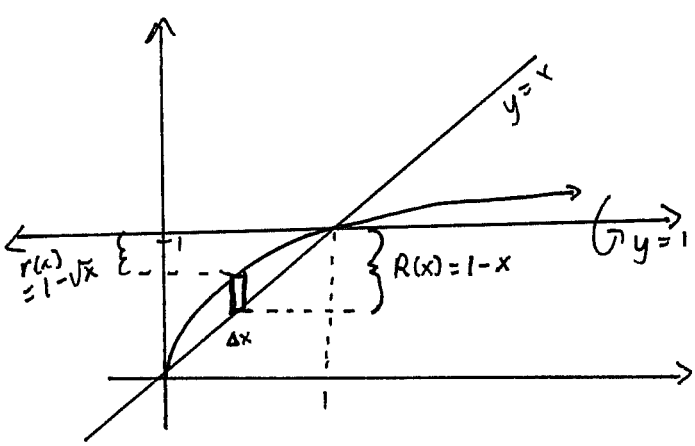
$$= \left[-\frac{x^2}{2} - \frac{x^3}{3} + 2x\right]_{-2}^{0} + \left[\frac{x^2}{2} - \frac{x^3}{3} + 2x\right]_{0}^{2}$$

$$= -\left[-\frac{(-2)^2}{2} - \frac{(-2)^3}{3} + 2(-2)\right] + \left[\frac{2^2}{2} - \frac{2^3}{3} + 2\cdot 2\right] = 2 - \frac{8}{3} + 4 + 2 - \frac{8}{3} + 4$$

$$= 20/3$$

Question 2. *(5 marks)* §7.2 #12
Find the volume of the solid obtained by rotating the region bounded by the given curves about the specified line.

$y = x$, $y = \sqrt{x}$; about y=1



rep. element.

$$\Delta V = \pi\left[(R(x))^2 - (r(x))^2\right]\Delta x$$
$$= \pi\left[(1-x)^2 - (1-\sqrt{x})^2\right]\Delta x$$
$$= \pi\left[1 - 2x + x^2 - 1 + 2\sqrt{x} - x\right]\Delta x$$
$$= \pi\left[x^2 - 3x + 2\sqrt{x}\right]\Delta x$$

$$V = \int_0^1 \pi\left[x^2 - 3x + 2\sqrt{x}\right]dx$$

$$= \pi\left[\frac{x^3}{3} - \frac{3x}{2} + 2\cdot\frac{2}{3}x^{3/2}\right]_0^1$$

$$= \pi\left[\frac{1}{3} - \frac{3}{2} + \frac{4}{2}\right]$$

$$= \frac{\pi}{6}$$