Dawson College: Calculus II (SCIENCE): 201-NYB-05-S03003: Winter 2013

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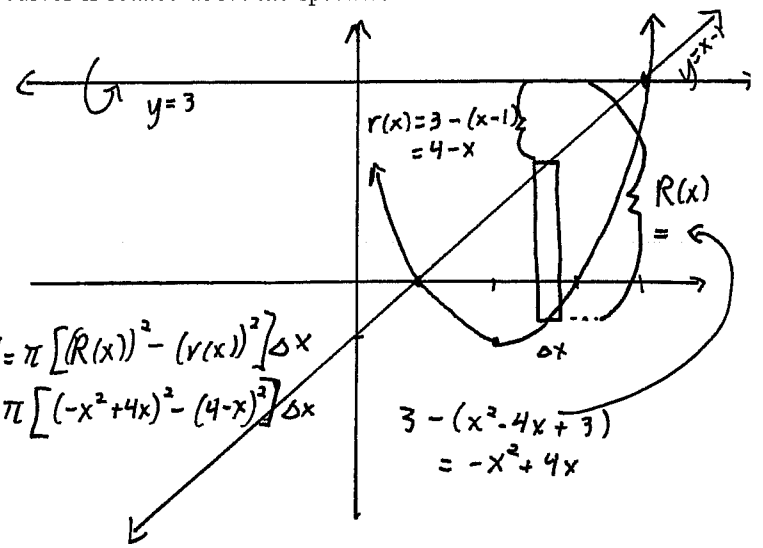
Quiz 9

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)* §7.2 #15 The region enclosed by the given curves is rotated about the specified line. Find the volume of the resulting solid.

$x-y=1$, $y=x^2-4x+3$; about $y=3$



$x-1=y$

Intersection of two curves

$x-1=x^2-4x+3$

$0=x^2-5x+4$

$0=(x-4)(x-1)$

$x=4$ $x=1$

Parabola: y-int: $(0,3)$

x-int: $0=x^2-4x+3$

$0=(x-3)(x-1)$

$x=3$ $x=1$

vertex: $y=(x-2)^2-1$

$V(2,-1)$

$\Delta V=\pi\left[(R(x))^2-(r(x))^2\right]\Delta x$

$=\pi\left[(-x^2+4x)^2-(4-x)^2\right]\Delta x$

$3-(x^2-4x+3)$

$=-x^2+4x$

$$V=\int_1^4 \pi\left[(-x^2+4x)^2-(4-x)^2\right]dx$$

$$=\int_1^4 \pi\left[x^4-8x^3+16x^2-16+8x-x^2\right]dx$$

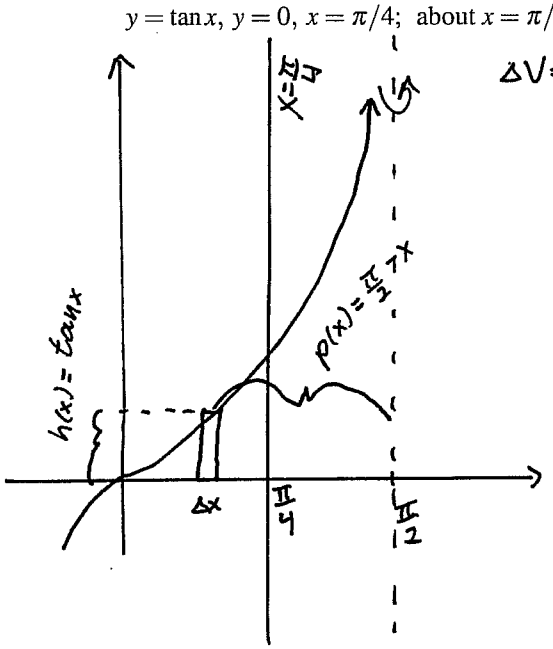
$$=\int_1^4 \pi\left[x^4-8x^3+15x^2+8x-16\right]dx$$

$$=\pi\left[\frac{x^5}{5}-\frac{8x^4}{4}+\frac{15x^3}{3}+\frac{8x^2}{2}-16x\right]_1^4$$

$$=\pi\left[\frac{x^5}{5}-2x^4+5x^3+4x^2-16x\right]_1^4$$

Question 2. *(5 marks)* §7.3 #22 Set up an integral for the volume of the solid obtained by rotating the region bounded by the given curves about the specified axis.

$y=\tan x$, $y=0$, $x=\pi/4$; about $x=\pi/2$



$\Delta V=2\pi p(x)h(x)\Delta x$

$=2\pi\left(\frac{\pi}{2}-x\right)\tan x\,\Delta x$

$$V=\int_0^{\pi/4} 2\pi\left(\frac{\pi}{2}-x\right)\tan x\,dx$$