Dawson College: Calculus II (SCIENCE): 201-NYB-05-S10: Winter 2016

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Quiz 4

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)* §5.3 #29 Evaluate the integral.

$\int_{-1}^{2}(x-2|x|)\,dx$

$$= \int_{-1}^{2} x\,dx - 2\int_{-1}^{2} |x|\,dx$$

$$= \left[\frac{x^2}{2}\right]_{-1}^{2} - 2\left[\int_{-1}^{0} |x|\,dx + \int_{0}^{2} |x|\,dx\right]$$

$$= \frac{2^2}{2} - \frac{(-1)^2}{2} - 2\left[\int_{-1}^{0} -x\,dx + \int_{0}^{2} x\,dx\right]$$

$$= 2 - \frac{1}{2} - 2\left[\left[-\frac{x^2}{2}\right]_{-1}^{0} + \left[\frac{x^2}{2}\right]_{0}^{2}\right]$$

$$= 2 - \frac{1}{2} - 2\left[\frac{(-1)^2}{2} + \frac{2^2}{2}\right]$$

$$= \frac{3}{2} - 2\left[\frac{5}{2}\right] = -\frac{7}{2}$$

Question 2. *(5 marks)* §5.4 #24 If $f(x) = \int_0^{\sin x} \sqrt{1+t^2}\,dt$ and $g(y) = \int_3^y f(x)\,dx$, find $g''(\pi/6)$.

$g'(y) = f(y)$ by 2nd FTC

$g''(y) = f'(y)$

and since $f(x) = h(c(x))$ where $h(x) = \int_0^x \sqrt{1+t^2}\,dx$

$c(x) = \sin x$

$f'(x) = h'(c(x))\,c'(x)$ where $h'(x) = \sqrt{1+x^2}$ by 2nd FTC

$c'(x) = \cos x$

$= \sqrt{1+\sin^2 x}\,\cos x$

$$g''(\pi/6) = \sqrt{1+\sin^2(\tfrac{\pi}{6})}\,\cos\tfrac{\pi}{6}$$

$$= \sqrt{1+(\tfrac{1}{2})^2}\,\frac{\sqrt{3}}{2} = \sqrt{\frac{5}{4}}\cdot\frac{\sqrt{3}}{2} = \frac{\sqrt{15}}{4}$$