**Dawson College: Calculus II**: 201-NYB-05-S2: Winter 2010

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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)* §5.4 #14 Use the Second Fundamental Theorem of Calculus to find the derivative of the function.

$$y = \int_{\sin x}^{\cos x} (1+v^2)^{10}\, dv$$

$$= \int_{\sin x}^{0} (1+v^2)^{10}\, dv + \int_{0}^{\cos x} (1+v^2)^{10}\, dv$$

$$= -\int_{0}^{\sin x} (1+v^2)^{10}\, dv + \int_{0}^{\cos x} (1+v^2)^{10}\, dv$$

$$= -f(g_1(x)) + f(g_2(x)) \quad \text{where } f(x) = \int_0^x (1+v^2)^{10}\, dv$$

$g_1(x) = \sin x$
$g_2(x) = \cos x$

$$y' = -f'(g_1(x))g_1'(x) + f'(g_2(x))g_2'(x)$$

$$= -(1+\sin^2 x)^{10}\cos x + (1+\cos^2 x)^{10}(-\sin x) \quad \text{where } f'(x) = (1+x^2)^{10}$$

$g_1'(x) = \cos x$
$g_2'(x) = -\sin x$

**Question 2.** *(5 marks)* §5.4 #17 Find the average value of

$g(x) = \cos x$

on the interval $[0, \frac{\pi}{2}]$

$$\text{Avg value} = \frac{1}{b-a}\int_a^b f(x)\,dx$$

$$= \frac{1}{\frac{\pi}{2} - 0}\int_0^{\frac{\pi}{2}} \cos x\, dx$$

$$= \frac{2}{\pi}\left[\sin x\right]_0^{\frac{\pi}{2}}$$

$$= \frac{2}{\pi}\left[\sin\frac{\pi}{2} - \sin 0\right]$$

$$= \frac{2}{\pi}$$