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

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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. *(5 marks)* §5.5 #50 Evaluate the following definite integral.

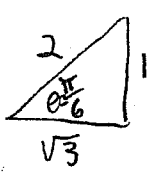
$$\int_0^{1/2} \frac{\arcsin x}{\sqrt{1-x^2}}\,dx$$

$u = \arcsin x$

$du = \frac{1}{\sqrt{1-x^2}}\,dx$

$u(0) = \arcsin 0 = 0$

$u\left(\frac{1}{2}\right) = \arcsin\left(\frac{1}{2}\right) = \frac{\pi}{6}$



$\sin\theta = \frac{opp}{hyp}$

$$= \int_0^{\frac{\pi}{6}} u\,du = \left[\frac{u^2}{2}\right]_0^{\frac{\pi}{6}}$$

$$= \frac{\left(\frac{\pi}{6}\right)^2}{2} - \frac{0^2}{2}$$

$$= \frac{\pi^2}{72}$$

Question 2. *(5 marks)* §6.1 #23 Evaluate the following definite integral.

$$\int_1^2 (\ln x)^2\,dx$$

$u = (\ln x)^2 \qquad du = 2\ln x \cdot \frac{1}{x}\,dx$

$v = x \qquad dv = dx$

$u = \ln x \qquad du = \frac{1}{x}dx$

$v = x \qquad dv = dx$

$$= \left[uv\right]_1^2 - \int_1^2 v\,du$$

$$= \left[x(\ln x)^2\right]_1^2 - \int_1^2 2\ln x \cdot \frac{1}{x} \cdot x\,dx$$

$$= 2(\ln 2)^2 - 1(\ln 1)^2 - 2\left[\left[uv\right]_1^2 - \int_1^2 u\,dv\right]$$

$$= 2(\ln 2)^2 - 2\left[\left[x\ln x\right]_1^2 - \int_1^2 x\cdot\frac{1}{x}\,dx\right]$$

$$= 2(\ln 2)^2 - 2\left[\left[2\ln 2 - 1\ln 1\right] - \left[x\right]_1^2\right]$$

$$= 2(\ln 2)^2 - 4\ln 2 + 2[2-1]$$

$$= 2(\ln 2)^2 - 4\ln 2 + 2$$