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Quiz 6

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)* §6.1 #20 Evaluate the definite integral.

$$\int_4^9 \frac{\ln y}{\sqrt{y}}\,dy = [uv]_4^9 - \int_4^9 v\,du = \left[2\sqrt{y}\ln y\right]_4^9 - \int_4^9 2\sqrt{y}\,\frac{1}{y}\,dy$$

$u = \ln y \qquad du = \frac{1}{y}\,dy$

$v = 2\sqrt{y} \qquad dv = \frac{1}{\sqrt{y}}\,dy$

$$= 2\sqrt{9}\ln 9 - 2\sqrt{4}\ln 4 - \int_4^9 \frac{2}{\sqrt{y}}\,dy$$

$$= 6\ln 9 - 4\ln 4 - \left[4\sqrt{y}\right]_4^9$$

$$= 6\ln 9 - 4\ln 4 - 4\sqrt{9} + 4\sqrt{4}$$

$$= 6\ln 9 - 4\ln 4 - 4$$

Question 2. *(5 marks)*§6.2 #32 Evaluate the indefinite integral.

$$\int \csc^4 x\cot^6 x\,dx = \int \csc^2 x\,\cot^6 x\,\csc^2 x\,dx$$

$u = \cot x$
$du = -\csc^2 x\,dx$
$-du = \csc^2 x\,dx$

$$= \int (1+\cot^2 x)\cot^6 x\,\csc^2 x\,dx$$

$$= \int (1+u^2)u^6(-du)$$

$$= -\int u^6 + u^8\,du$$

$$= -\left[\frac{u^7}{7} + \frac{u^9}{9}\right] + C$$

$$= -\left(\frac{\cot^7 x}{7} + \frac{\cot^9 x}{9}\right) + C$$