

MAT4-120 Calculus of a Single Variable II

Quiz 5 December 16, 2015

solution

name

You must show your work for full credit on this quiz.

1. (8 pts.) Evaluate the following integrals

Worksheet
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a. $\int \sin^2 x \cos x dx = \int u^2 du = \frac{u^3}{3} + C = \frac{(\sin x)^3}{3} + C.$

$u = \sin x$

$\frac{du}{dx} = \cos x$

$du = \cos x dx$

Worksheet

16.

b. $\int x\sqrt{x-3} dx = \int (u+3) u^{1/2} du = \int u^{3/2} + 3u^{1/2} du$

$u = x-3 \quad x = u+3$

$du = dx$

$= \frac{u^{5/2}}{5/2} + 3 \cdot \frac{u^{3/2}}{3/2} + C$

$= \frac{2}{5} u^{5/2} + 2 u^{3/2} + C$
 $= \frac{2}{5} (x-3)^{5/2} + 2(x-3)^{3/2} + C.$

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P342
(assigned)

2. (4 pts.) $\int_0^2 \frac{x}{(1+x^2)^3} dx$

$u = 1+x^2$
 $du = 2x dx$

$u_{x=0} = 1$
 $u_{x=2} = 5$

$= \frac{1}{2} \int_1^5 \frac{1}{u^3} du = \frac{1}{2} \int_1^5 u^{-3} du$

$= \frac{1}{2} \left(\frac{u^{-2}}{-2} \right) \Big|_1^5$

$= \frac{1}{2} \left[-\frac{5^{-2}}{2} - -\frac{1^{-2}}{2} \right]$

$= \frac{1}{2} \left[-\frac{1}{50} + \frac{1}{2} \right] = \frac{24}{100} = .24$
 or $\frac{6}{25}$