SOLUTIONS (all 3 versions)

QUIZ 0 Math 34 (Calc II), Spring 2013

This does not count towards your grade. It's just practice.

Evaluate these definite integrals using substitution. Show work.

(a) $\int_{\pi/2}^{\pi} 3\sin x \cos x \, dx$

$u =$ $\sin x$ $du =$ $\cos x \, dx$ $3\sin x \cos x \, dx =$ $3u \, du$

$\int_{\pi/2}^{\pi} 3\sin x \cos x \, dx =$

$$\int_1^0 3u \, du = -3\int_0^1 u \, du$$

$$= -\frac{3}{2}\left[u^2\right]_0^1 = -\frac{3}{2}$$

Simplify your answer.

(b) $\int_0^{1/2} x\sqrt[3]{1-x^2} \, dx$

$u =$ $1-x^2$ $du =$ $-2x \, dx$ $x\sqrt[3]{1-x^2} \, dx =$ $-\frac{1}{2}\sqrt[3]{u} \, du$

$\int_0^{1/2} x\sqrt[3]{1-x^2} \, dx =$

$$\int_1^{3/4} \left(-\tfrac{1}{2}\right)\sqrt[3]{u} \, du = \frac{1}{2}\int_{3/4}^1 \sqrt[3]{u} \, du$$

$$= \frac{3}{8}\left[u^{4/3}\right]_{3/4}^1 = \frac{3}{8}\left[1-\left(\frac{3}{4}\right)^{4/3}\right]$$

DO NOT SIMPLIFY your answer.

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Evaluate these definite integrals using substitution. Show work.

(a) $\int_{\pi/2}^{\pi} 4 \sin x \cos x \, dx$

$u =$ $\sin x$ $du =$ $\cos x \, dx$ $4 \sin x \cos x \, dx =$ $4u \, du$

$\int_{\pi/2}^{\pi} 4 \sin x \cos x \, dx =$

$$\int_1^0 4u \, du = -4 \int_0^1 u \, du$$

$$= -2 \left[u^2 \right]_0^1 = -2$$

Simplify your answer.

(b) $\int_0^{1/2} x \sqrt[4]{1-x^2} \, dx$

$u =$ $1 - x^2$ $du =$ $-2x \, dx$ $x \sqrt[4]{1-x^2} \, dx =$ $-\frac{1}{2} \sqrt[4]{u} \, du$

$\int_0^{1/2} x \sqrt[4]{1-x^2} \, dx =$

$$\int_1^{3/4} \left(-\tfrac{1}{2}\right) \sqrt[4]{u} \, du = \frac{1}{2} \int_{3/4}^1 \sqrt[4]{u} \, du$$

$$= \frac{4}{10} \left[u^{5/4} \right]_{3/4}^1 = \frac{2}{5} \left[1 - \left(\tfrac{3}{4}\right)^{5/4} \right]$$

DO NOT SIMPLIFY your answer.

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Evaluate these definite integrals using substitution. Show work.

(a) $\int_{\pi/2}^{\pi} 5 \sin x \cos x \, dx$

$u =$ $\sin x$ $du =$ $\cos x \, dx$ $5 \sin x \cos x \, dx =$ $5u \, du$

$\int_{\pi/2}^{\pi} 5 \sin x \cos x \, dx =$ $5\int_1^0 u \, du = -5/2$

Simplify your answer.

(b) $\int_0^{1/2} x\sqrt[5]{1-x^2} \, dx$

$u =$ $1-x^2$ $du =$ $-2x \, dx$ $x\sqrt[5]{1-x^2} \, dx =$ $-\frac{1}{2}\sqrt[5]{u} \, du$

$\int_0^{1/2} x\sqrt[5]{1-x^2} \, dx =$ $-\frac{1}{2}\int_1^{3/4} \sqrt[5]{u} \, du = -\frac{5}{12}\left(\left(\frac{3}{4}\right)^{6/5} - 1\right)$

DO NOT SIMPLIFY your answer.