4.5 U-Substitution - cont.

ex: Evaluate.

a) $\int_0^1 x\left(x^2+1\right)^3 dx$

ALTERNATE WAY

ex: Evaluate.

a) $\int_0^1 x\left(x^2+1\right)^3 dx$

ex: Evaluate.

b) $\int_0^{\pi/2} \cos\left(\frac{2x}{3}\right) dx$

ALTERNATE WAY

ex: Evaluate.

b) $\int_0^{\pi/2} \cos\left(\frac{2x}{3}\right) dx$

ex: Rewrite the definite integral in terms of u.

a) Let $u = 3x - 2$; $\int_0^1 (3x-2)^3 \, dx$

ex: Rewrite the definite integral in terms of u.

b) Let $u = 2x + 3$; $\int_{-1}^{1} \frac{1}{2x+3}\,dx$

ex: Rewrite the definite integral in terms of u.

d) Let $u = 4 - x^2$; $\int_0^{\sqrt{3}} \frac{x\,dx}{\sqrt{4-x^2}}$

ex:

Using the substitution $u = \sqrt{x}$, $\int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$ is equal to which of the following?

(A) $2\int_1^{16} e^u\,du$ (B) $2\int_1^4 e^u\,du$ (C) $2\int_1^2 e^u\,du$ (D) $\frac{1}{2}\int_1^2 e^u\,du$ (E) $\int_1^4 e^u\,du$

4.6 The Natural Logarithmic Function: Integration

Review:

$$\frac{d}{dx}\left[\ln x\right] =$$

$$\frac{d}{dx}\left[\ln |x|\right] =$$

$$\frac{d}{dx}\left[\ln u\right] =$$

THEOREM 4.19 Log Rule for Integration

Let u be a differentiable function of x.

1. $\int \frac{1}{x}\,dx =$
2. $\int \frac{1}{u}\,du =$

ex: Integrate.

a) $\int \frac{6}{x} dx$

ex: Integrate.

b) $\int \frac{1}{3x+5} dx$

ex: Integrate.

c) $\int \frac{2x}{x^2+6} dx$

ex: Integrate.

d) $\int \frac{\sec^2 x}{\tan x} dx$

ex: Integrate.

h) $\int \frac{1}{x \ln x} dx$

long division

$$\int \frac{3x^2 - 7x + 2}{x + 5} dx$$

ex: Integrate.

l) $\int_0^1 \frac{x-1}{x+1} dx$

FR 10

The acceleration of a particle moving along a straight line is given by $a = 10e^{2t}$.

(a) Write an expression for the velocity v, in terms of time t, if $v = 5$ when $t = 0$.

(b) During the time that the velocity increases from 5 to 15, how far does the particle travel?

(c) Write an expression for the position s, in terms of time t, of the particle if $s = 0$ when $t = 0$.