Student: ____________________ **Date:** ____________________	**Instructor:** Carlos Sotuyo **Course:** MAC 2311 – Calculus and Analytical Geometry I	**Assignment:** Section 5.6 Enhanced Assignment

1. Use the Substitution Formula, $\int_a^b f(g(x)) \cdot g'(x)\,dx = \int_{g(a)}^{g(b)} f(u)\,du$ where $g(x) = u$, to evaluate the following integral.

$$\int_{-\pi/4}^{0} \tan x \sec^2 x\,dx$$

$\int_{-\pi/4}^{0} \tan x \sec^2 x\,dx =$ $\mathbf{-\frac{1}{2}}$

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2. Use the Substitution Formula, $\int_a^b f(g(x)) \cdot g'(x)\,dx = \int_{g(a)}^{g(b)} f(u)\,du$ where $g(x) = u$, to evaluate the following integrals.

a. $\int_0^1 t\sqrt{36+13t}\,dt$ **b.** $\int_1^{25} t\sqrt{36+13t}\,dt$

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a. $\int_0^1 t\sqrt{36+13t}\,dt =$ $\mathbf{\frac{2822}{845}}$

b. $\int_1^{25} t\sqrt{36+13t}\,dt =$ $\mathbf{\frac{4,136,664}{845}}$

3.

Use the Substitution Formula, $\int_a^b f(g(x)) \cdot g'(x)\,dx = \int_{g(a)}^{g(b)} f(u)\,du$ where $g(x) = u$, to evaluate the following integrals.

a. $\int_0^{\frac{\pi}{6}} (1 - \cos 3t)\sin 3t\,dt$ **b.** $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} (1 - \cos 3t)\sin 3t\,dt.$

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a. $\int_0^{\frac{\pi}{6}} (1 - \cos 3t)\sin 3t\,dt = \mathbf{\frac{1}{6}}$

(Simplify your answer.)

b. $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} (1 - \cos 3t)\sin 3t\,dt = \mathbf{\frac{1}{2}}$

(Simplify your answer.)

4.

Use the substitution formula $\int_a^b f(g(x))g'(x)dx = \int_{g(a)}^{g(b)} f(u)du$ where $g(x) = u$, to evaluate the following integral.

$$\int_0^{\pi} 4(7 - 3\cos t)^{1/3} \sin t\,dt$$

$\int_0^{\pi} 4(7 - 3\cos t)^{1/3} \sin t\,dt = \mathbf{10^{4/3} - 4^{4/3}}$

5.

Use the Substitution Formula, $\int_a^b f(g(x)) \cdot g'(x)\,dx = \int_{g(a)}^{g(b)} f(u)\,du$ where $g(x) = u$, to evaluate the following integral.

$$\int_0^{\frac{\pi}{5}} \frac{5\sin(5t)}{6 - \cos(5t)}\,dt.$$

$\int_0^{\frac{\pi}{5}} \frac{5\sin(5t)}{6 - \cos(5t)}\,dt = \mathbf{\ln \frac{7}{5}}$ (Type an exact answer.)

6.

Use the Substitution Formula, $\int_a^b f(g(x)) \cdot g'(x)\,dx = \int_{g(a)}^{g(b)} f(u)\,du$ where $g(x) = u$, to evaluate the following integral.

$$\int_1^7 \frac{3(\ln x)^2}{x}\,dx$$

Determine a change of variables from y to u. Choose the correct answer below.

- **A.** $u = x$
- **B.** $u = 3(\ln x)^2$
- **C.** $u = \frac{3(\ln x)^2}{x}$
- **D.** $u = \ln x$ (selected)

Write the integral in terms of u.

$$\int_1^7 \frac{3(\ln x)^2}{x}\,dx = \int_{0}^{\ln 7} 3u^2\,du$$

Evaluate the integral.

$$\int_1^7 \frac{3(\ln x)^2}{x}\,dx = (\ln 7)^3$$ (Type an exact answer.)

7.

Use the Substitution Formula, $\int_a^b f(g(x)) \cdot g'(x)\,dx = \int_{g(a)}^{g(b)} f(u)\,du$ where $g(x) = u$, to evaluate the following integral.

$$\int_0^{\ln \frac{\sqrt{3}}{3}} \frac{5e^x\,dx}{1+e^{2x}}$$

$$\int_0^{\ln \frac{\sqrt{3}}{3}} \frac{5e^x\,dx}{1+e^{2x}} = -\frac{5\pi}{12}$$

(Type an exact answer, using π as needed.)

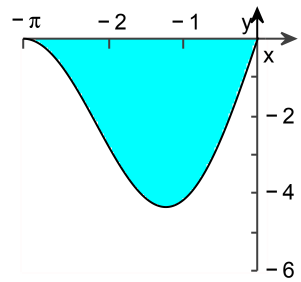
8. Use the Substitution Formula, $\int_a^b f(g(x)) \cdot g'(x)\,dx = \int_{g(a)}^{g(b)} f(u)\,du$ where $g(x) = u$, to evaluate the following integral.

$$\int_{\frac{\sqrt{2}}{5}}^{\frac{2}{5}} \frac{dy}{y\sqrt{25y^2 - 1}}$$

$$\int_{\frac{\sqrt{2}}{5}}^{\frac{2}{5}} \frac{dy}{y\sqrt{25y^2 - 1}} = \frac{\pi}{12}$$

(Type an exact answer in terms of π.)

9. Find the total area of the shaded region shown to the right given by the curve $y = 4(\sin x)\sqrt{1 + \cos x}$.



The total area of the shaded region is $\frac{2^{9/2}}{3}$. (Type an exact answer.)