Integral Calculus	Test 3	Name:
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$\int \tan u \, du = -\ln|\cos u| + c$

$\int \cot u \, du = \ln|\sin u| + c$

$\int \sec u \, du = \ln|\sec u + \tan u| + c$

$\cos 2\theta = 2\cos^2\theta - 1 = 1 - 2\sin^2\theta$

$\sin^2\theta + \cos^2\theta = 1$

$\tan^2\theta + 1 = \sec^2\theta$

$\int \csc u \, du = -\ln|\csc u + \cot u| + c$

$\int \frac{du}{\sqrt{a^2 - u^2}} = \arcsin\frac{u}{a} + c$

$1 + \cot^2\theta = \csc^2\theta$

Arc length $= \int_a^b \sqrt{1 + [f'(x)]^2}\, dx$

$\int \frac{du}{a^2 + u^2} = \frac{1}{a}\arctan\frac{u}{a} + c$

$\int \frac{du}{u\sqrt{u^2 - a^2}} = \frac{1}{a}\text{arcsec}\frac{|u|}{a} + c$

Volume $= \int_a^b \pi r^2 dx$

Surface area $= \int_a^b 2\pi r * arclength\, dx$

You must show all work in order to receive full credit. Circle your final answers.

Evaluate the indefinite integral.

1. $\int x^2 e^x dx$

2. $\int \tan^3 x \sec x \, dx$

3. Evaluate the indefinite integral using the substitution $x = 4\sin\theta$.

$$\int \frac{\sqrt{16 - x^2}}{x} dx$$

4. Evaluate the definite integral.

$$\int_0^{\pi/4} x \cos x \, dx$$

5. Sketch and find the area of the region bounded by the graphs of the given functions.

$y = -x^2 + 4x + 5$,	$x + 5$

Sketch the region and set up the integrals, but do not evaluate, to find the volume of the solid generated by revolving the region bounded by the graphs of the equations about the indicated lines.

6. $y = \sqrt{x}$, $y = 0$, $x = 0$, $x = 9$, about the y – axis

7. $y = \frac{1}{x}$, $y = 0$, $x = 2$, $x = 5$, about the x – axis

8. $y = -x^2 + 5, y = 1,$ about the line $y = -2$

9. Set up and simplify the integral, but do not evaluate, to find the arc length of the given function on the interval.

$y = \frac{3}{2}x^{2/3}$, [1.8]

10. Set up and simplify the integral, but do not evaluate, to find the surface area of the solid generated by revolving the graph of the equation about the indicated line.

$y = 2\sqrt{x}$,	[4,9]