Date: 11/15/13.

Instructor: Cody Clifton.

Name: _____

This 10-point quiz will test your knowledge of integration by parts and the method of partial fractions. Read carefully and always show your work. You have 15 minutes... good luck!

(1) State the general formula for *integration by parts* in terms of u and v.

Solution.

$$\text{(indefinite) } \int udv = uv - \int vdu \qquad \text{or} \qquad \text{(definite) } \int_a^b udv = uv\Big|_a^b - \int_a^b vdu.$$

(2) Evaluate $\int x^2 \sin x \, dx$.

Solution. Use the table method!

	derivatives of u	antiderivatives of v
$+$	x^2	$\sin x$
$-$	$2x$	$-\cos x$
$+$	2	$-\sin x$
$-$	0	$\cos x$

From the table, we find that

$$\int x^2 \sin x \, dx = -x^2 \cos x + 2x \sin x + 2\cos x + C.$$

(3) Use the method of partial fractions to find $\displaystyle\int \frac{4x}{(x+3)(x-1)} dx$.

Solution. First, set up the partial fractions decomposition and find A and B.

$$\frac{4x}{(x+3)(x-1)} = \frac{A}{x+3} + \frac{B}{x-1} \implies 4x = A(x-1) + B(x+3).$$

Let $x = 1$:

$$4 = A(0) + B(4) \implies B = 1.$$

Let $x = -3$:

$$-12 = A(-4) + B(0) \implies A = 3.$$

Hence, the partial fractions decomposition of the original integrand is

$$\frac{4x}{(x+3)(x-1)} = \frac{3}{x+3} + \frac{1}{x-1},$$

and we find that

$$\int \frac{4x}{(x+3)(x-1)} dx = \int \frac{3}{x+3} dx + \int \frac{1}{x-1} dx = 3\ln|x+3| + \ln|x-1| + C.$$