TEACHER INSTRUCTIONS

To make one classroom set for 4-Color Activity:

1. Assemble envelopes for each group of students who will be working together. For my class of 32 students working in pairs, I laminated 16 colored copies of pages 2 through 5, cut them into their respective slips and then created 16 envelopes containing a full set of four colors from:

    1 copy of page 2 on white paper
    1 copy of page 3 on blue paper
    1 copy of page 4 on green paper
    1 copy of page 5 on yellow paper

2. Copy enough 2-sided copies of page 6 and 7 so that each student and/or group receives one.
3. On the day of the activity, hand out the 2-sided copies and an envelope to each group. Instruct them to perform the matching activity for each problem and then to write their solutions on the assignment sheet.
4. My students tend to complete this activity in about 45-50 minutes, and I've found it to be a nice change of pace from the typical homework set for integration problems of this type. Student feedback has been positive since it provides a bit of variety along with the practice, and performance on the exam problems requiring this skill improved.

SOLUTION: Print out this file as is and each problem will align with the components of its solution on subsequent pages.

1. $\int_0^1 \frac{x}{\sqrt{1+5x^2}}\,dx$	**2.** $\int_4^9 \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx$
3. $\int_1^{\sqrt{2}} (4-2x^2)^7 \cdot x\,dx$	**4.** $\int_{-\sqrt[3]{6}}^{\sqrt[3]{3}} x^2 \cdot \sqrt[3]{x^3+5}\,dx$
5. $\int_2^9 \sqrt[3]{x^2-2x+1}\,dx$	**6.** $\int_a^b (g(x))^r \cdot g'(x)\,dx;\ \ r \neq -1$
7. $\int_0^3 \frac{1}{4x^2+9}\,dx$	**8.** $\int_{\frac{\pi}{12}}^{\frac{\pi}{6}} \frac{\cos(3x)}{\sin^2(3x)}\,dx$
9. $\int_{-1}^1 x \cdot \sec^2(4x^2-5)\,dx$	**10.** $\int_0^1 \left(x^4+1\right)^4 \cdot x^7\,dx$

$dx = \frac{du}{10x}$	$dx = 2u \cdot du$
$dx = \frac{du}{-4x}$	$dx = \frac{du}{3x^2}$
$dx = du$	$dx = \frac{du}{g'(x)}$
$dx = \frac{3}{2} du$	$dx = \frac{du}{3\cos(3x)}$
$dx = \frac{du}{8x}$	$dx = \frac{du}{4x^3}$

$\frac{1}{10}\int_{1}^{6} u^{-\frac{1}{2}}du$	$2\int_{2}^{3}\cos u\,du$
$\frac{1}{4}\int_{0}^{2} u^{7}\,du$	$\frac{1}{3}\int_{-1}^{8} u^{\frac{1}{3}}du$
$\int_{1}^{8} u^{\frac{2}{3}}\,du$	$\int_{g(a)}^{g(b)} u^{r}du$
$\frac{1}{6}\int_{0}^{2}\frac{1}{u^{2}+1}du$	$\frac{1}{3}\int_{\frac{\sqrt{2}}{2}}^{1} u^{-2}\,du$
$\frac{1}{8}\int_{-1}^{-1}\sec^{2}u\,du$	$\frac{1}{4}\int_{1}^{2}\left(u^{5}-u^{4}\right)du$

$\frac{1}{5}\left(\sqrt{6}-1\right)$	$2\sin 3-2\sin 2$
8	$\frac{15}{4}$
$\frac{93}{5}$	$\frac{\left(g(b)\right)^{r+1}-\left(g(a)\right)^{r+1}}{r+1}$
$\frac{1}{6}\tan^{-1}(2)$	$\frac{2-\sqrt{2}}{3\sqrt{2}}$
0	$\frac{43}{40}$

Integration by Substitution Four Color Activity

Name ______________________ **Period** _______

Grade

WHITE		**BLUE**	**GREEN**		**YELLOW**
Original Problem	**What is *u*?** ***u* = _____**	**Find *dx***	**Rewrite integral with *u*-limits, *u* and *du***	**Integrate**	**Evaluate for final answer**
1. $\int_0^1 \frac{x}{\sqrt{1+5x^2}}\,dx$					
2. $\int_4^9 \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx$					
3. $\int_1^{\sqrt{2}} (4-2x^2)^7 \cdot x\,dx$					
4. $\int_{-\sqrt[3]{6}}^{\sqrt[3]{3}} x^2 \cdot \sqrt[3]{x^3+5}\,dx$					
5. $\int_2^9 \sqrt[3]{x^2-2x+1}\,dx$					

WHITE		BLUE	GREEN		YELLOW
Original Problem	**What is *u*?** **u = ______**	**Find *dx***	**Rewrite integral with *u* and *du***	**Integrate**	**Evaluate for final answer**
6. $\int_a^b (g(x))^r \cdot g'(x)\,dx$ $r \neq -1$					
7. $\int_0^3 \frac{1}{4x^2+9}\,dx$					
8. $\int_{\frac{\pi}{12}}^{\frac{\pi}{6}} \frac{\cos(3x)}{\sin^2(3x)}\,dx$					
9. $\int_{-1}^{1} x \cdot \sec^2(4x^2-5)\,dx$					
10. $\int_0^1 \left(x^4+1\right)^4 \cdot x^7\,dx$					