Activity: Sort-the-Steps for Integration by Substitution

Each group receives three envelopes, each containing the steps for a different problem (see below). The steps for each problem should be precut into separate strips, shuffled so that they are no longer in order and inserted into their respective envelopes. Be sure to number the envelopes.

Problem #1

$$\int \frac{e^{\sin x}}{\sec x}\,dx$$

$$\int e^{\sin x}\cos x\,dx$$

$$u = \sin x$$

$$du = \cos x\,dx$$

$$\int e^u\,du$$

$$e^u + C$$

$$e^{\sin x} + C$$

Problem #2*

$$\int \frac{8x}{4x^2 - 1}\,dx$$

$$u = 4x^2 - 1$$

$$du = 8x\,dx$$

$$\int \frac{1}{4x^2 - 1}\cdot 8x\,dx$$

$$\int \frac{1}{u}\,du$$

$$\ln|u| + C$$

$$\ln|4x^2 - 1| + C$$

*Note that it would also be correct to place the fourth step in this problem as the second step.

[See next page for an additional problem.]

Problem #3

$$\int x\sqrt{6-x^2}\,dx$$

$$u=6-x^2$$

$$du=-2x\,dx$$

$$-\frac{1}{2}\int \sqrt{6-x^2}\,(-2x)\,dx$$

$$-\frac{1}{2}\int \sqrt{u}\,du$$

$$-\frac{1}{2}\int u^{1/2}\,du$$

$$-\frac{1}{2}\left(\frac{2}{3}u^{3/2}\right)+C$$

$$-\frac{1}{2}\left(\frac{2}{3}\left(6-x^2\right)^{3/2}\right)+C$$

$$-\frac{1}{3}\left(6-x^2\right)^{3/2}+C$$