Use u-substitution to find the following integrals. Feel free to talk to your neighbors, but try not to use your book or notes.

1. \[ \int x(2x + 5)^8 dx \]
   \[ u = 2x + 5 \implies x = \frac{u - 5}{2}, \quad du = 2dx \]
   \[ \int x(2x + 5)^8 dx = \int \left( \frac{u - 5}{2} \right)^8 \left( \frac{1}{2} du \right) = \frac{1}{4} \int (u^9 - 5u^8) du = \frac{1}{4} \left( \frac{1}{10}u^{10} - \frac{5}{9}u^9 \right) + C \]
   \[ = \frac{1}{40}(2x + 5)^{10} - \frac{5}{45}(2x + 5)^9 + C \]

2. \[ \int_1^2 \frac{e^{1/x}}{x^2} dx \]
   \[ u = \frac{1}{x} \implies du = -\frac{1}{x^2} dx \]
   \[ \int_1^2 \frac{e^{1/x}}{x^2} dx = -\int_1^{1/2} e^u du = -[e^u]_{1/2} = (-e^{1/2}) - (-e^1) = e^1 - e^{1/2} \]
   Note that we had to change the limits of integration to be in terms of \( u \) instead of \( x \).

3. \[ \int \cot x \, dx \]
   \[ \cot x = \frac{\cos x}{\sin x} \]
   \[ u = \sin x \implies du = \cos x \, dx \]
   \[ \int \frac{\cos x}{\sin x} \, dx = \int \frac{1}{u} \, du = \ln |u| + C = \ln |\sin x| + C \]