

Name: \_\_\_\_\_

Clear your desk of everything except pens, pencils and erasers. **Show all your work.**

If you have a question raise your hand and I will come to you.

1. [5 points] Solve the initial value problem below. You may leave the answer in implicit form.

$$\left(\frac{1}{e^y} + 1\right) \sin x = (1 + \cos x) \frac{dy}{dx}; \quad y(0) = 0.$$

2. [5 points] Suppose that the voltage  $V(t)$  of electricity at time  $t$  (in seconds) is draining from a capacitor at a rate that is proportional to its value. That is,  $V(t)$  satisfies the differential equation

$$V'(t) = -kV(t),$$

where  $k > 0$  is the constant of proportionality. If  $k = \frac{1}{14}$ , how long will it take the voltage to drop to 20 percent of its original value?