Reminder: you are required to cite any and all sources used in solving these problems.

Name: ____________________________________________

1. (10 points) Design an NPN transistor current source with a base supply voltage of 5 V, a collector supply voltage of 10 V, and a target constant current of 10 mA. Assuming that $\beta = 100$, determine the value of the base resistor, and the range of collector (load) resistance over which you expect the current source to produce 10 mA. What happens when the collector/load resistance goes above this range?

2. (10 points) Design an NPN transistor switch for a light bulb with a resistance of 50 $\Omega$ and a collector supply voltage of $V_{cc} = 6$ V. Make sure the current into the base will guarantee operation in saturation mode. You have some flexibility on the input end, just make sure that $V_{in}$ and $R_b$ are chosen to give the right base current.