**Conclusion Questions**

1. How is Lightbot like a computer?
2. How is Lightbot different than a computer?
3. One aim of this course is to consider the relationship between humans and computers. Read the following background and write a journal style response to one of the two sets of questions below.

Lightbot has only a few instructions and only three variables to describe its state. Alan Turing proved that simple computers like this can do all the computation that a modern computer can do. A small set of simple instructions can produce intelligence, or at least the appearance of it.

A human brain contains roughly one hundred billion neurons: 1011 neurons. The state of the neurons' connections and chemistry in one human brain at any one instant could be represented by 10 16 to 10 19 zeros and ones.

In his controversial book, *The Singularity Is Near*, Ray Kurzweil projects that computers will be exceed the computational power and memory of a human brain around 2035. He predicts a “singularity” in 2045 in which machines quickly design smarter machines on their own.

* 1. When computers become smart enough that we cannot tell humans and computers apart (the **Turing Test**), do you think that computers will experience consciousness the way we do? Should they have rights?
  2. Someday the technology might exist to create an artificial neuron that is able to connect to and communicate with human neurons. If one artificial neuron replaced one human neuron in a person’s brain, behaving the same (in terms of input, states, and outputs) as the neuron it replaced, would the person still be the same person or even still a human? What if a second neuron is replaced? What if all of the neurons in the brain were replaced, one by one. At what point do you call this a computer instead of a human? Why?