Name: _____ **Date:** _____

Aim: Why should we study computer science?

ARTIFICIAL INTELLIGENCE

Is the theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

Much of the research done in the past 12 months has been in the field of *neural networking* and *machine learning*.

Neural network: A computer system modeled on the human brain and nervous system

1) As humans, we can tell that the picture on the right is of a dog. Why do you think it is more challenging for a computer?
   - **Humans have experience/knowledge of what dogs look like**
   - **There are many different dog breeds**
   - **Computer only sees the image as 1s and 0s**
   - **Computer has a difficult time interpreting (can only answer factual questions)**

2) Why is the interpretation of images and sounds more challenging for a computer than calculating the distance between Earth and Pluto? Which one would be more challenging for a human to do (without any technology)?
   - **A human can interpret images and sounds better than a computer.**
   - **A computer can calculate distances more quickly.**
   - **Computers are better at numerical information whereas humans are better at logic**

Quick, Draw!

Quick, Draw! was created by Google and challenges players to draw a picture of an object or idea and then uses a neural network artificial intelligence to guess what the drawings represent. The AI learns from each drawing, increasing its ability to guess correctly in the future. The concepts that it guesses can be simple, like 'foot', or more complicated, like 'animal migration'. The implicit argument is that when humans draw, they make abstractions of the world. They sketch the generalized concept of "owl" not any particular animal. That is to say, there is a connection between how our brains store "looking like an owl" and how we draw owls.

1) In what way is Google's Quick Draw an elementary form of Artificial Intelligence?
2) Why do you think this was a difficult application to program/code? What did the computer programmers have to think about?

- **Many different drawings**
- **Different ways to draw an object**

3) What do you think advancements to this application will be in the future?

- **More images**
- **Colors**

Auto Draw

AutoDraw is a new kind of drawing tool. It pairs machine learning with drawings from talented artists to help everyone create anything visual, fast. AutoDraw's suggestion tool uses the same technology used in QuickDraw, to guess what you're trying to draw.

1) How is this program different from Quick Draw?

SKIP

2) From a programming/coding perspective, what do you think were the major differences between the two programs?

SKIP

Now you try:

https://quickdraw.withgoogle.com/
https://www.autodraw.com/

Sketch-RNN

This experiment lets you draw together with a recurrent neural network model called Sketch-RNN. Once you start drawing an object, Sketch-RNN will come up with many possible ways to continue drawing this object based on where you left off. The model can also mimic your drawings and produce similar doodles. It's just another example of how you can use machine learning in fun and creative ways.

Single Prediction:
https://magenta.tensorflow.org/assets/sketch_rnn_demo/index.html

Multiple Prediction:
https://magenta.tensorflow.org/assets/sketch_rnn_demo/multi_predict.html

1) What is impressive about Sketch-RNN?

SKIP

2.) What are some things that the computer programmers/coders had to think about when coding this application?

SKIP

A.I. Duet

This experiment lets you play a duet with the computer. Just play some notes, and the computer will respond to your melody. You don't even have to know how to play piano. You can click the keyboard, use your computer keys, or even plug in a MIDI keyboard. It's just one example of how machine learning can inspire people to be creative in new ways.

1) What are some differences in what the computer has to interpret in A.I. duet versus some of the drawing applications we studied?

SKIP

2) Do you foresee any potential pros/cons in creating a program like A.I. duet?

SKIP

Now you try!
https://aiexperiments.withgoogle.com/ai-duet/view/

Paying with Your Face

Face-detecting systems in China now authorize payments, provide access to facilities, and track down criminals. Will other countries follow? Over the past few years, computers have become incredibly good at recognizing faces, and the technology is expanding quickly in China in the interest of both surveillance and convenience. Face recognition might transform everything from policing to the way people interact every day with banks, stores, and transportation services. Technology from a company, Face++, is already being used in several popular apps. It is possible to transfer money through Alipay, a mobile payment app used by more than 120 million people in China, using only your face as credentials.

Meanwhile, Didi, China's equivalent of Uber, uses the Face++ software to let passengers confirm that the person behind the wheel is a legitimate driver. (A "liveness" test, designed to prevent anyone from duping the system with a photo, requires people being scanned to move their head or speak while the app scans them.)

1) What are some positive outcomes of this technology?

SKIP

2) What are some potential drawbacks?

SKIP