

# CS 230, Quiz 1

## Solutions

### Problem 1 (1 points)

Images represent a wide range of colors by combining just three: red, green, blue. Why does this work?

The human eye uses three cone cells to detect color. These cells are strongly stimulated by red, green, and blue light. The eye detects all colors through the amount of activation on these three types of cells. A mixture of red, green, and blue can be used to activate the cells in a wide range of combinations, causing the brain to perceive a wide range of colors.

This is a bit of an approximation, as the red cell actually peaks in sensitivity closer to yellow, and the cones overlap significantly. As a result of this approximation, the RGB system does not represent all colors that you are able to see.

### Problem 2 (1 points)

T/F. Dot products commute. (That is,  $u \cdot v = v \cdot u$ ).

True.

### Problem 3 (1 points)

T/F. Cross products commute. (That is,  $u \times v = v \times u$ ).

False.

### Problem 4 (1 points)

One can verify algebraically that:  $u \cdot (u \times v) = 0$ . Explain the geometrical meaning of this identity.

The cross product  $u \times v$  always produces a vector orthogonal to its inputs  $u$  and  $v$ . The dot product between orthogonal vectors is zero.