Can You Escape a Velociraptor?

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This code was created for the purpose of figuring out if a human can outrun a velociraptor. A series of codes were created in the Jupyter Notebook that would be able to determine the time and distance a human ran when a velociraptor caught them, the time and distance a human ran if the velociraptor was one meter behind them, both to estimate the probability that the human was able to escape the velociraptor. The tests and data showed that a human had about a sixty percent chance of escaping the velociraptor that made three attempts to catch it.

I. WHEN DOES THE VELOCIRAPTOR CATCH UP TO YOU

For this section, my task was to write a code to determine when the velociraptor would catch an average human. I was first able to define the time as zero, then created a while loop that put values for t into each of the functions I defined to calculate the distance the human and velociraptor travelled. Therefore, the first part of my code resembled this:

$$t = 0$$

$$while\ t <= 10 :$$

with ten acting as the time span(from zero seconds to ten seconds) from which I collected data. It was stated that the human was traveling at three meters per second, and was originally thirty meters away from the velociraptor. So, my formula for the distance the human ran for each value of t in the loop was

$$human\_distance = (3 * t) + 30$$

A velociraptor runs at eighteen meters per second, so for the velociraptor formula I used the formula

$$velociraptor\_distance = 18 * t$$

to find the distance the velociraptor ran for each value of t. The time that the human and velociraptor distance are equal is the condition for the if statement and reads

$$if\ human\_distance - velociraptor\_distance >= 0 :$$

Using this condition inside of the while loop, the time and the distance that the human ran at the moment the velociraptor caught up was printed to the screen, with the time value through the loop increasing by one hundredth seconds. A break in the code was included so that only the first values that met the condition were printed. Next, a graph was created to give a visual representation of the data generated by the code. One hundred points were generated for the time interval between zero and ten seconds. The x-axis of the graph was the time interval zero to ten in seconds, and the y-axis was the position of the human or raptor in meters. The y-axis goes from zero to one hundred and eighty because that is the distance that a raptor should be able to travel in ten seconds. With the same formulas for human and velociraptor distance, Figure 1 was generated

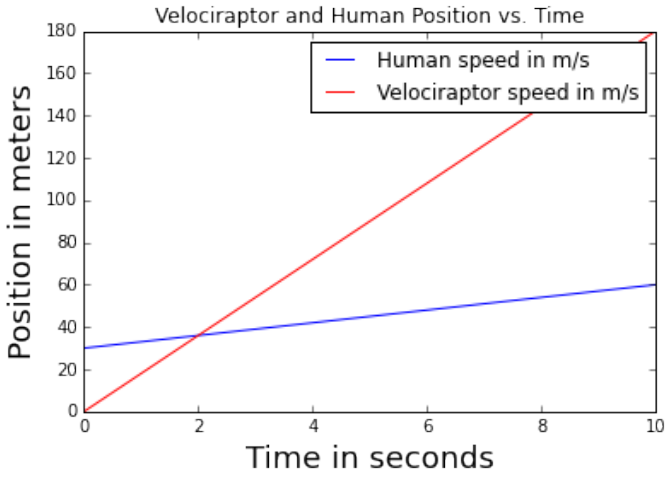

FIG. 1: Figure 1

II. WHEN IS THE VELOCIRAPTOR IS ONE METER AWAY

For the second question, a code needed to be created(in a similar way to the code from the first question) that would determine when the velociraptor was one meter away from the human, and how far the human had run in that time. The same type of while loop, the same human distance formula, and the same velociraptor distance formula were used. This time, however, the if statement was set up so that it would calculate when the human and velociraptor were one meter apart

$$if\ human\_distance - velociraptor\_distance >= 1 :$$

For this question, the time and distance the human had run were printed that met the condition, a break in the code was included, and the time was increasing by one hundredth seconds.

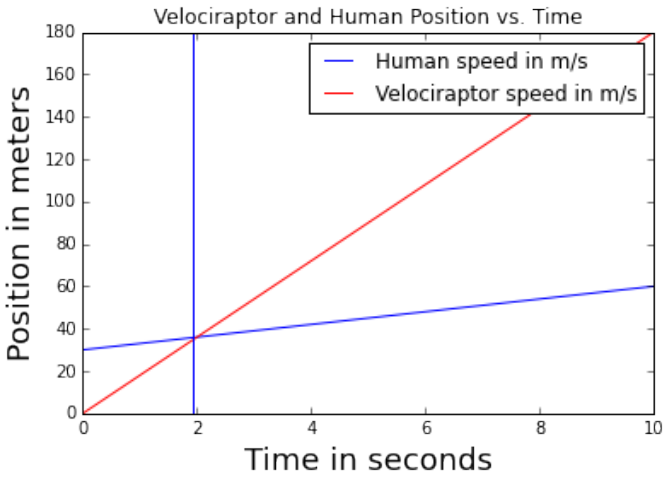

FIG. 2: Figure 2

The graph was also the same as the one in the previous question, except for this time, a vertical line ran through the point that the velociraptor was one meter behind the human. This was done by creating a plotted line from zero to one hundred and eighty that remained through the x-value 1.94 (the time that was found using the loop) for the duration of the line. Therefore,Figure 2 appeared as such

III. WILL IT BITE YOU?

The final section of the code generated the probability that the velociraptor will bite you. The variable npeople was created, which generated numbers however many times were specified. The variable nlived served as the initial value. Using a for loop in the range zero and the value of npeople to see how many times the loop would run, the variable "first chance" was created to generate a random number.

$$npeople = 100000$$

$$nlived = 0$$

$$for\ i\ in\ range(0, npeople)\ :$$

$$first\_chance = np.random.random()$$

Then, an if statement was placed to state that if the first chance was greater than 0.2(since there is a twenty percent chance of being caught), the condition would move on to the second chance. This continued, with the number moving down the line if it met the conditions, until finally, if the third condition was passed, it was determined that you escaped:

$$if\ first\_chance > 0.2\ :$$
$$second\_chance = np.random.random()$$

$$if\ second\_chance > 0.15\ :$$

$$if\ third\_chance > 0.07\ :$$

By running this loop and adding one to each value of nlived that passed through, the possibility of escaping was calculated.

IV. CONCLUSION

Through running this code, it was determined that
1. The raptor catches you after 2.0 seconds when you have run 6 meters
2.The raptor is one meter away after 1.94 seconds when you have run 5.82 meters.
3.There is a 63.222 percent chance that you will get away.