Spy Problem 1

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1 Problem

The hero of a popular spy story, Captain Calculus, has escaped from the secret headquarteres of a international diamond-smuggling ring in the tiny Mediterranean country of El-Lispa. Driving a stolen milk truck (or is it really a beer truck in disguise?) at $72\frac{km}{h}$, the spy has a 40-minute head start on his pursuers, who are chasing him in a Ferrari going $168\frac{km}{h}$. The distance from his smuggler's headquarters in El-Lipsa to the border, and freedom, is $83.3km$. **Will our hero make it?**

2 Solution

This problem suffers the same ending as many actions movies of today. Obviously the main character is going to survive in order for the sequels to occur. Leaving that aside, let us do some math to actually prove that Captain Calculus can survive.

We know that for Captain Calculus to survive, he has to reach the border first. Captain Calculus' milk truck has a head start of 40 minutes should he is $\frac{40}{60} * 72 = 48$ km ahead of his pursuers. To reach his goal of the border, he has to travel an extra $35.3km$. This will take him about $\frac{35.3}{72} \approx 0.49h \approx 29min$ to pass the border after his pursuers start.

His pursuers can only transverse the whole $83.3km$ in about $\frac{83.3}{168} = 0.4958h = 29.75min$. Since it takes his pursuers more time to get to the border than him, Captain Calculus will be able to make it out alive.

This does bring up the question: how close was he to death? Well by analyzing the time difference between the amount of time Captain Calculus took to get to the border after his pursuers started and how long his pursuers took, we see that he was only ahead of them by $3600 * (\frac{83.3}{168} - \frac{83.3-\frac{40}{60}*72}{72}) = 20$ seconds. The distance difference was an even smaller amount of $83.3 - 168 * \frac{83.3-\frac{40}{60}*72}{72} = \frac{14}{15}km$

Wow that sure was a close escape! I hope Captain Calculus the best spy can survive next time!