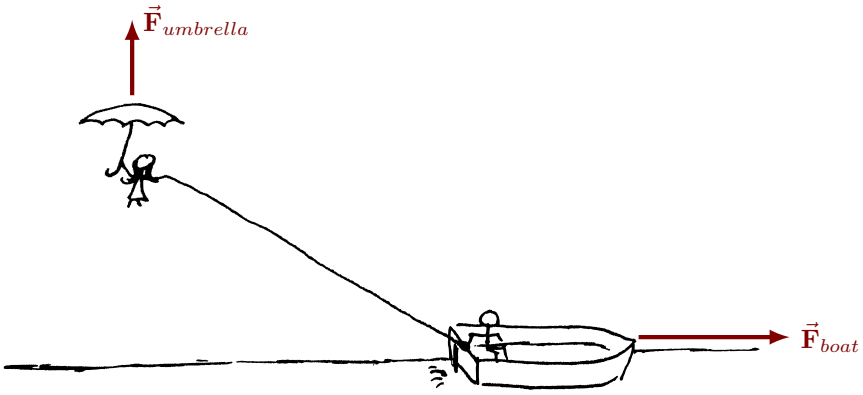
Please answer the questions below to the best of your ability either in the space provided. Everything should be scanned or photographed and submitted through gradescope.com.

Objective: *I can analyze multi-mass systems undergoing a change in momentum to determine unknown forces in the system.*

1. Mary Poppin's umbrella is capable of generating a lifting force of 1000 N. Out for a bit of extreme-sporting, Mary is having herself towed behind a speed boat such as in the image below. Mary has a mass of 60 kg while the boat has a mass of 6000 kg. The boat engine exerts a 20 000 N force pushing the boat forwards and once in position Mary does not move up or down.



   (a) What net force does Mary experience in the x-direction?

(b) What angle does the tow rope make with the horizontal?

(c) What is the tension in the tow rope?

(d) The boat has a cross-sectional area of $15\,\mathrm{m}^2$. How deep does it sit in the water while moving?