A well-mixed tank initially containing 1.0 L pure water is fed a solution of 12.0 g/L glucose at a constant rate of 100 mL/min. Simultaneously, a leak in the bottom of the tank allows fluid to exit at a constant rate of 30 mL/min. The glucose solution is dilute enough so that the density is identical to the density of water.

Find:

i)   What time does the concentration of glucose in the tank reach 5.0 g/L?
ii)   At the time determined in part i), what is the volume of the fluid in the tank?

Pre-problem thoughts:

1.   What are the components?

2.   What are the subsystems?

3.   What are the streams?

4.   What type of balance should be performed?

5.   Steady-state vs. unsteady-state and reactive vs unreactive.