Medical Equipment II - 2011
Exercise 1

1. Consider the estimation of ultrafiltration rate in hemodialysis using 2 flowmeters before and after the dialyzer to measure the dialysate flow rate. If the flowmeters have an accuracy of 1%, compute the estimation accuracy for the ultrafiltration rate. Assume the dialysate flow rate as 1L/min and assume it is required to remove 1 Kg of water from the patient every hour during the treatment.

2. Consider the estimation of ultrafiltration rate in hemodialysis using 2 flowmeters before and after the dialyzer to measure the dialysate flow rate. If it is desired to reach estimation accuracy for ultrafiltration that is compliant with the AAMI standard, compute the required accuracy for the flowmeters to be used in the system to achieve this. Assume the dialysate flow rate as 1L/min and assume it is required to remove 0.8 Kg of water from the patient every hour during the treatment.

3. A new method of measuring ultrafiltration relies on detecting changes in hematocrit value to detect changes in the amount of water removed from the body. Assuming that the volume of water in the blood increases by 100 mL for every Kg excess water in the body, compute the change in hematocrit value for the case of 1 Kg of excess water. Assume that formed elements in the blood do no change during the dialysis session.