**Essay Questions for Unit 4 Exam**

1. Explain how solutes and water are reabsorbed in the kidney tubules. Be sure to include the reabsorption of Na+, glucose, water, Cl-, Ca++, K+ etc. Include in your discussion how the various solutes are reabsorbed (i.e. sodium, glucose, amino acids) and the concept of renal threshold and saturation. Discuss the process of filtration. In your discussion, describe the filtration membrane in the renal corpuscle and the pressures involved in filtration. Discuss how blood flow may be regulated to the glomerulus. Describe what GFR is and then explain the principle of "clearance" and how it is used to estimate GFR.  Explain tubuloglomerular feedback. Explain the Renin/ Angiotensin/ Aldosterone system. Describe what happens at the cellular level with ADH and Aldosterone. In part 2 of this essay, explain how the loop of Henle is used to establish and maintain the renal medullary concentration gradient. Explain how this gradient and ADH can work together to excrete urine of different concentrations.

2. Explain all of the membranes, pressures and mechanisms that make negative pressure ventilation possible. Describe what a pneumothorax is and how it occurs. What is surfactant? How does a lack of surfactant impair ventilation. In this discussion, explain surface tension and the role of Laplace's Law. Explain the alveolar gas equation and how it can be useful clinically. Discuss how CO2 and O2 are transported in the blood. Include a description of the oxygen hemoglobin-dissociation curve and factors that influence the affinity of hemoglobin for oxygen. How do these factors affect the oxygen / hemoglobin dissociation curve?