

**ChEE 201
Fall 2002
Final Exam**

Name _____

Problem 1 _____

Problem 2 _____

Problem 3 _____

Problem 4 _____

Problem 5 _____

Problem 1 (25 points)

Find one root to the following equation using a root finding technique. You may verify your answer with your calculator, but must show your work with a root finding technique to get full credit:

$$f(x) = x^3 - x^2 - e^x + 1$$

Problem 2 (35 points)

A mixture of 40 mole percent MIBK ($C_6H_{12}O$) with 30 mole percent water and acetone at $25^\circ C$ and 1 atm is mixed before being passed it to a settling tank. What is the ratio of MIBK-rich to water-rich phases in kg/kg?

Problem 3 (30 points)

A mixture of 40 mole percent MIBK with 30 mole percent water and acetone is passed to a heating unit. If the temperature is raised to 50°C in a sealed chamber, turning some but not all of the chemicals into a vapor, what is the final pressure in psi?

Problem 4 (40 points)

20 moles of methane is mixed with 60 moles of ethane and burned to completion, yet no CO is formed. What are the mole fractions of the stream leaving the combustor if 20 percent excess air was fed?

Problem 5 (30 points)

50 kg/min of steam enters a pump saturated at 100°C . If you neglect kinetic and potential energy terms and the process is adiabatic, what is the temperature of the exiting steam if the pump does 100 hp of work isobarically?