KSU – Chemical Engineering Department
ChE 320 (Chemical Reactor Engineering) – TUT #6
Name: **ID:** **SN:**

1. Solve example 6.1 using Polymath, to produce 30 ton of NO, at 450^{o}C.

2. Solve Problem 6.6 (a, b, c), using Polymath.

(*Membrane reactor*) The first-order, gas-phase, reversible reaction

$$A \rightleftharpoons B + 2C$$

is taking place in a membrane reactor. Pure A enters the reactor, and B diffuses out through the membrane. Unfortunately, a small amount of the reactant A also diffuses through the membrane.

(a) Plot and analyze the flow rates of A, B, and C and the conversion X down the reactor, as well as the flow rates of A and B through the membrane.

(b) Next, compare the conversion profiles in a conventional PFR with those of a membrane reactor from part **(a)**. What generalizations can you make?

(c) Would the conversion of A be greater or smaller if C were diffusing out instead of B?

Additional information:

$k = 10\ \text{min}^{-1}$ $F_{A0} = 100\ \text{mol/min}$
$K_C = 0.01\ \text{mol}^2/\text{dm}^6$ $v_0 = 100\ \text{dm}^3/\text{min}$
$k_{CA} = 1\ \text{min}^{-1}$ $V_{\text{reactor}} = 20\ \text{dm}^3$
$k_{CB} = 40\ \text{min}^{-1}$