15.761.1 Homework 3
Due: August 12. 2002

Problem 1:

PCDF manufactures artificial diamonds (PCD) to be used in cutting tools. The diamonds are produced in round plates and sold to tool manufacturers. As long as the diameter of a plate is at or above 4 mm, the plate can be sold at full price, otherwise it is sold with an $88 discount.

Since the exact diameter of a plate is random (normally distributed), *PCDF* decided to adjust their process to increase expected diameter size to 4.02 mm. From previous experience, the production manager knows that an increase in 0.01 mm diameter size roughly corresponds to $1 additional costs per plate. With the process being in control, *PCDF* took 40 samples with 5 observations each (see "PCD Data.xls, sheet "In Control") to establish control charts for the process.

With the control limits established, *PCDF* takes one sample every day, corresponding to 5% of daily production (see "PCD Data.xls, sheet "Pre Problem"). On day 43 the production is stopped and the process scrutinized. It turns out that a pressure valve has deteriorated and that the high pressures necessary for diamond production can no longer be attained. To avoid the high repair costs of $25,000, the production manager decides to experiment with the main other parameters of diamond production, (time and temperature) to bring average plate sizes back in control. After a few days of experimentation, the process is back up again (days 48-76, "PCD Data.xls, sheet "Post Problem").

a) Do you think it is reasonable to aim for an expected diameter size of 4.02 mm?
b) What could have been the reason for stopping the process on day 43?
c) Is the process back in control after the adjustments (days 48-76)?
d) What do you think about avoiding the repair costs?

Problem 2:

Draw the network graph for the Dreamcast Project, given the activities in "VideoLaunch.xls" and determine the critical path. What other activities might become critical?