STATISTICS 3N03/3J04 – TEST #3A – 2006-11-27

Aids permitted: *any calculators, any tables and one sheet of notes (8.5" x 11", one side only).*

1. Analyze the following two data sets with appropriate graphics and *P*-values. State your assumptions and your conclusions. Wherever possible, assess the validity of your assumptions. *[32 marks]*

   (a) Measurements of traffic noise, in dBA, were made at 10 locations in Bangkok. At each location, the noise was measured in the acceleration and deceleration lanes. Can you conclude that noise differs between the acceleration and deceleration lanes? Do the analysis two ways, with and without assuming normality; do your conclusions agree? Which test has the greater power? Which test is the more robust?

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   Accel:  78.1 78.1 79.6 81.0 88.7 88.1 78.6 78.5 88.4 79.6
   Decel:  78.6 80.0 79.3 79.1 78.2 78.0 78.6 78.8 78.0 78.4
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   (b) A polymer is manufactured in a batch chemical process and viscosity measurements made on each batch. A process change was made that involved switching the type of catalyst used in the process. The following data show viscosity for 12 batches before the change and 8 batches after. Is there evidence that the change in catalyst caused a change in mean viscosity?

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   Before:  724 718 776 760 745 759 795 756 742 740 761 749
   After:   735 775 729 755 783 760 738 780
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2. Consider the data in Q1b. If you did a test at the 5% level of significance and the true difference in mean viscosity was 10, what would be the probability of a Type II error? *[5 marks]*
3. Give the full name and three interesting facts about the chemist who invented the *t*-distribution. *[3 marks]*