1. [11 marks] The data below show the 1 year returns (as of September 30, 2006) for randomly selected Canadian and U.S. equity mutual funds. It has been suggested that Canadian equity funds have outperformed U.S. equity funds in the past year. The Minitab output gives some appropriate and inappropriate analyses of the data.

CdnEq1	3.46	5.84	-0.01	16.97	14.6	4.39	10.26	13.06	4.85	11.33	5.19	3.87
USEq2	13.04	0.45	4.96	6.09	4.68	-0.32	0.29	3.52	9.87	4.23	2.81	-1.44

(a) [5 marks] Test whether Canadian funds have outperformed U.S. funds. Use the .05 level of significance. *Show how the test statistic is calculated.*

(b) [3 marks] Explain how you selected the specific test above and explain whether the assumptions of the test are warranted.

(c) [3 marks] Given that INGDirect offered a 3% rate of return on savings accounts during the past year, test whether Canadian equity funds have performed better than funds placed in INGDirect. Use the .05 level.

2. [6 marks] The data below compares the rates of return on equity last year and this year for a sample of Canadian small businesses. The Minitab output gives some output that may or may not be helpful.

RofR1	13.966	11.1395	8.3104	10.0634	18.3224	7.8564	10.783	5.3086	12.5726	1.1173	7.3576	6.3016	5.4648	15.8778	18.5251
RofR2	15.2405	9.6101	10.6785	11.5555	11.9431	6.2496	4.6547	6.5608	12.6578	1.3674	8.1469	7.2978	4.1749	15.7108	15.9875
Diff2	-1.27452	1.52944	-2.36808	-1.49208	6.3794	1.60678	6.12832	-1.25215	-0.08517	-0.25008	-0.7893	-0.99617	1.28993	0.16691	2.53763

(a) [4 marks] Test whether there is sufficient evidence to conclude that the rates of return are different between the two years. *Show how the test statistic is computed.*

(b) [2 marks] Explain whether the assumptions of the test above are warranted and justify your selection of the test completed.

3. Some psychologists believe that people think better when they are properly rested and that performance on an exam depends on the time of day. To investigate this, some data have been collected on students' performance on exams scheduled in the morning (start time before noon), in the afternoon (start time between noon and 4pm), and in the evening (start time after 4pm). The summary of these data (number of people at each performance level and time) is presented below.

Grade	Morning	Afternoon	Evening	Total
A	50	65	54	169
B	69	87	74	230
C	33	59	48	140
D	25	31	31	87
F	14	22	18	54
Total	191	264	225	680

a) [2 marks] Based on this data, find the 95% confidence interval for the overall failure rate.

b) [2 marks] If you were to estimate the overall failure rate with a 95% confidence level and a 1% margin of error, how large a sample size would be required?

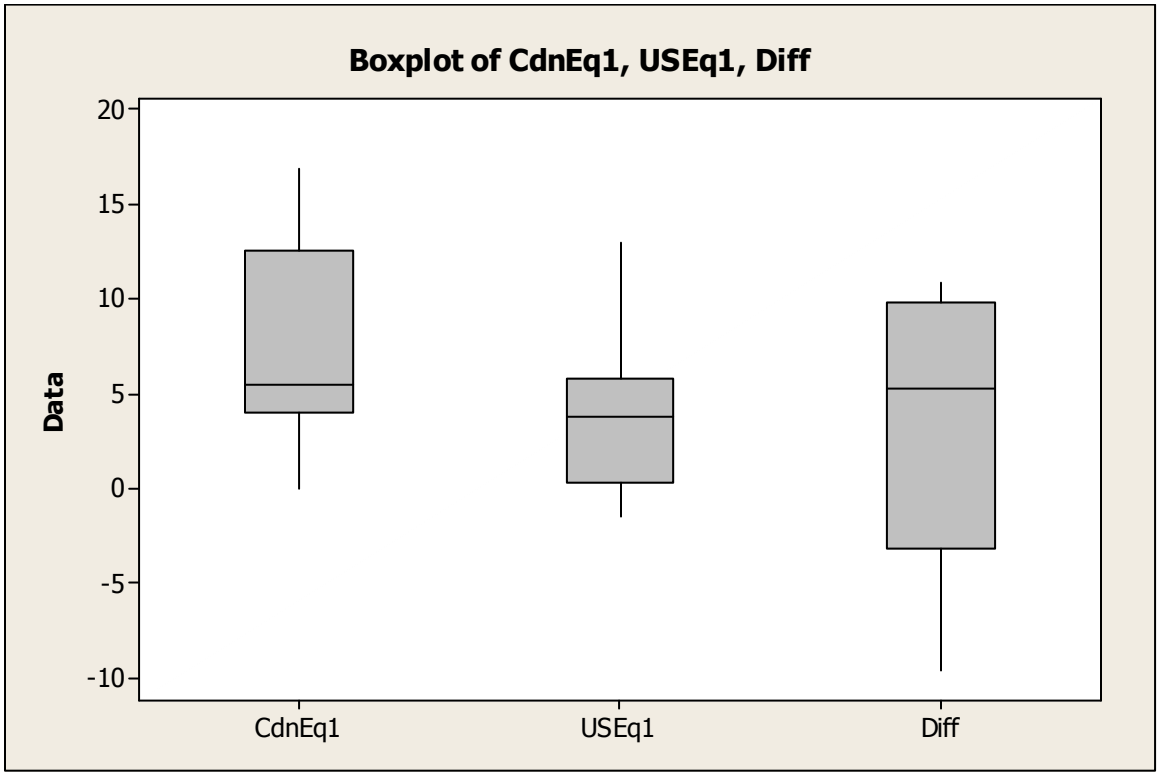
c) [4 marks] Do you think the failure rate is different for morning and afternoon exams? Test your hypothesis at the 5% significance level.

d) [3 marks] Of 20 students who took the course for the second time, 2 failed again. Can you be 95% sure that the probability of failing the same course for the second time is less than 20%?

e) [3 marks] Suppose you want to determine if the probability of getting a C is the same for all three times. State the appropriate test and hypotheses, rearrange the data into a form required to perform this test, and briefly explain how you would set up the next set of calculations. Please do not carry out any actual computations or complete the test in any way.

f) [4 marks] Test whether there is or is not an equal distribution of As, Bs, and Cs among students who got at least a C on the final exam. Start by stating the appropriate test and complete the test using the .05 level of significance.

1. CANADIAN AND U.S. FUND RETURNS




```
         N  Mean  StDev  SE Mean
CdnEq1  12  7.82   5.25      1.5
USEq1   12  4.02   4.25      1.2
```

Two-Sample T-Test and CI: CdnEq1, USEq1

```
Difference = mu (CdnEq1) - mu (USEq1)
Estimate for difference:  3.80250
95% CI for difference:  (-0.24905, 7.85405)
T-Test of difference = 0 (vs not =): T-Value = _____  P-Value = 0.064  DF = 21
```

Two-Sample T-Test and CI: CdnEq1, USEq1

```
Difference = mu (CdnEq1) - mu (USEq1)
Estimate for difference:  3.80250
95% CI for difference:  (-0.23787, 7.84287)
T-Test of difference = 0 (vs not =): T-Value = ______  P-Value = 0.064  DF = 22
Both use Pooled StDev = _____
```

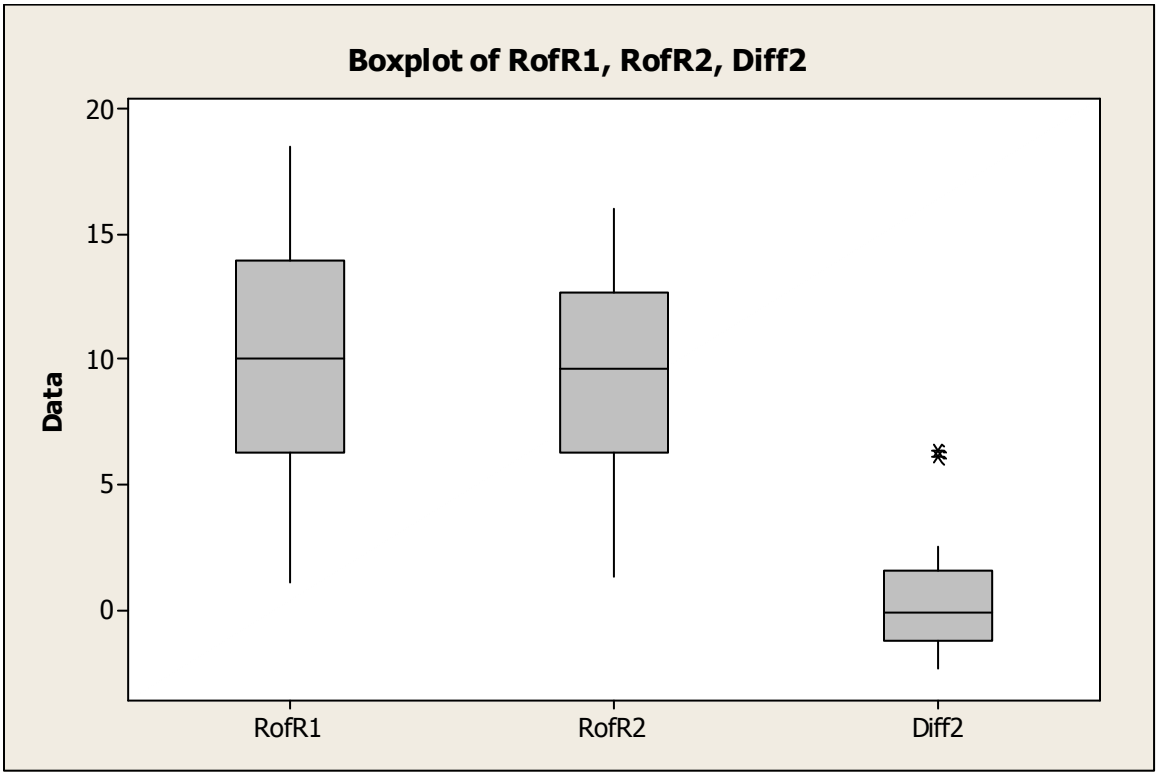
Paired T-Test and CI: CdnEq1, USEq1

```
Paired T for CdnEq1 - USEq1

             N     Mean    StDev  SE Mean
CdnEq1      12  7.81750  5.24635  1.51449
USEq1       12  4.01500  4.24532  1.22552
Difference  12  3.80250  6.81489  1.96729

95% lower bound for mean difference: 0.26948
T-Test of mean difference = 0 (vs > 0): T-Value = _______  P-Value = 0.040
```

2. RETURN ON EQUITY



Two-Sample T-Test and CI: RofR1, RofR2

```
Two-sample T for RofR1 vs RofR2

        N   Mean  StDev  SE Mean
RofR1  15  10.20   5.00      1.3
RofR2  15   9.46   4.46      1.2

Difference = mu (RofR1) - mu (RofR2)
Estimate for difference:  0.742057
95% CI for difference:  (-2.808336, 4.292451)
T-Test of difference = 0 (vs not =): T-Value = ____  P-Value = 0.671  DF = 27
```

Paired T-Test and CI: RofR1, RofR2

```
Paired T for RofR1 - RofR2

             N      Mean     StDev   SE Mean
RofR1       15   10.1978    4.9983    1.2905
RofR2       15    9.4557    4.4642    1.1527
Difference  15  0.742057  2.615299  0.675267

95% lower bound for mean difference: -0.447298
T-Test of mean difference = 0 (vs > 0): T-Value = ____  P-Value = 0.145
```