34.955	33.279	32.240
39.082	40.421	36.129
31.354	33.876	34.242
28.531	38.584	33.981
35.388	31.708	32.729
32.007	39.926	32.510
34.236	32.991	32.143
33.419	33.939	33.180
34.632	34.035	33.896
34.053	33.764	27.393
31.217	33.562	34.937
30.646	35.434	33.934
34.249	35.161	36.522
31.840	34.255	31.959
31.180	38.061	36.321
34.028	34.885	33.323
34.529	36.876	31.464
	34.585	35.055
		30.227

A group of 54 patients suffering from a disease
Each of the three subgroups was cured by a dis
the patients' bloods were tested to see the effe
There are 17, 18, 19 patients in the first, secon
The values of $_1$, $_2$, $_3$, which are presented in
of the blood tests of the first, second, third gro

- At the significance level of = 5 %, test the n
- Formulate the null hypothesis $_1 = _2 = _3$ that
- Formulate the alternative hypothesis that the
- Calculate:

— the group sums and the group sample mean
— the grand sum and the grand sample mean

- Calculate the quantity SS_B = the sum of squar
- Calculate the quantity SS_W = the sum of squar
- Calculate the Coefficient of Determination (

Is the fit "good"/"poor"?

- Determine the quantity DF_B = the degrees of
- Determine the quantity DF_W = the degrees of
- Calculate the quantity MS_B = the mean squar

i.e. the the sample variance between the group

- Calculate the quantity MS_W = the mean squar

i.e. the the sample variance within the groups =

- Calculate the statistic = $MS_B / MS_W = (SS_B /$
- Calculate the critical value .
- Calculate the *p*-value of the test.
- Do you reject or fail to reject the null hypothe

was divided into three subgroups.
stinct method. After the treatment,
ect of the respective treatment.
d, third group, respectively.
column A,B,C, are the results
up, respectively.
ull hypothesis that all three treatments have the same effect.
all three treatments have the same effect.
effect of at least one treatment is different.

es "between" = RegSS.
res "within" = RSS.
^{2} = RegSS / TSS, where TSS = RegSS+RSS).

freedom "between".
freedom "within".
es "between",
os = SS_B / DF_B.
res "within",
= SS_W / DF_W.
SS_W) / (DF_B / DF_W).

esis?

3.8561	3.8993	3.7895
3.7656	4.2493	3.9607
3.7815	4.1771	3.8786
4.3176	4.0661	4.0504
3.9476	4.1042	3.7234
4.0355	4.0782	4.0493
3.9140	4.0601	3.8858
4.1162	3.9634	4.0049
4.1717	3.9194	4.0820
4.2424	4.1112	4.0099
4.0455	3.8839	3.7335
3.9302	4.2153	4.1394
3.7449	4.1208	3.9488
3.9567	3.8706	4.1098
4.1941	3.9350	4.1912
3.9546	3.8188	3.9844
3.7186	4.0522	4.0978
3.9927	4.3246	3.9921
4.0302	3.5822	3.9913
3.8388	3.8159	4.0615
3.7065	3.6214	3.9361
4.1795	4.2596	4.1131
3.7748	3.6856	4.3017
4.1145	4.1045	3.8698
3.8462	3.8758	3.9632
3.8228	4.2381	4.2873
4.1278	3.8984	4.1440
3.7701	3.6096	4.0555
3.9243	4.1651	3.8680
3.9039	3.7881	4.2965
4.1394	3.5936	3.9819
3.9595	4.1995	3.7590
3.7583	4.1139	3.8615
4.0545	3.8896	3.9272
	4.0341	4.1750
	3.9074	4.1189
	3.8565	
	3.8752	

We tested the mileage of three cars, and you are given t
You have 34 observations of the mileage of the first car.
You have 38 observations of the mileage of the second c
You have 36 observations of the mileage of the third car.
Assume for simplicity that the random error is normally
has the same variance in each of the three samples (hom
• At the significance level of = 5 %, test the null hypoth
• Formulate the null hypothesis $_1 = _2 = _3$ that all three
• Formulate the alternative hypothesis that the mileage
• Calculate:
— the group sums and the group sample means -
— the grand sum and the grand sample mean -
• Calculate the quantity SS_B = the sum of squares "betwe
• Calculate the quantity SS_W = the sum of squares "withi
• Calculate the Coefficient of Determination (^{2} = RegSS
Is the fit "good"/"poor"?
• Determine the quantity DF_B = the degrees of freedom '
• Determine the quantity DF_W = the degrees of freedom
• Calculate the quantity MS_B = the mean squares "betwe
i.e. the the sample variance between the groups = SS_B / D
• Calculate the quantity MS_W = the mean squares "withi
i.e. the the sample variance within the groups = SS_W / DF
• Calculate the statistic = $MS_B / MS_W = (SS_B / SS_W) / (D$
• Calculate the critical value .
• Calculate the *p*-value of the test.
• Do you reject or fail to reject the null hypothesis?

hree samples of observations.

ar.
.
distributed and
noskedasticity).
nesis that all three cars have the same results.
cars have the same mileages.
of at least one mileages is different.

een" = RegSS.
n" = RSS.
/ TSS, where TSS = RegSS+RSS).

"between".
"within".
een",
DF_B.
n",
F_W.
F_B / DF_W).

178.8	208.3
181.4	211.9
178.1	210.4
179.8	212.5
179.4	212.0
180.8	208.5
184.4	213.2
180.3	210.6
178.3	211.3
180.4	211.3
178.2	216.5
178.6	211.6
183.8	209.0
177.4	209.3
178.6	208.3
179.0	209.7
181.8	211.0
180.8	212.8
181.6	207.9
179.6	212.4
179.3	212.8
181.7	208.7
181.2	209.1
181.1	212.4
184.4	211.7
176.4	210.6
178.0	208.2
174.0	211.9
183.9	211.4
180.4	212.6
182.7	
183.5	
181.8	
184.4	
180.3	
183.3	
177.7	
184.4	
180.8	
179.0	

You are given two samples of observations.
You have 40 observations of a random variable
(profit of company A observed during 40 consecutive
days) and 30 observations of random variable
(profit of company B observed during 30 consecutive days).
Assume for simplicity that both variables are normally distributed ar
• Use the two sample *t*-test to test the null hypothesis that the (pop
against the two-sided alternative hypothesis that they are different.
Calculate the *p*-value.
Considering the significance level = 1 %, do you reject or fail to rej
• Use the ANOVA *F*-test to test the null hypothesis that the (populat
against the two-sided alternative hypothesis that they are different.
Calculate the *p*-value.
Considering the significance level = 5 %, do you reject or fail to rej

nd have the same variance.
ulation) means and are the same,

ect the null hypothesis?
:ion) means and are the same,

ect the null hypothesis?

61.29	55.25
54.98	59.45
55.94	63.79
56.43	59.01
55.61	61.03
54.49	62.74
59.99	59.13
58.47	63.57
60.32	65.25
58.67	62.90
60.93	64.04
57.66	58.20
53.87	57.64
55.45	60.51
66.02	60.17
69.34	58.30
59.44	54.09
61.95	55.43
64.73	63.46
60.13	58.06
59.56	62.10
63.28	60.36
63.71	54.77
59.63	56.66
56.14	59.04
54.62	63.71
61.14	63.31
60.84	57.31
62.28	59.99
57.91	57.02
	60.03
	57.96
	57.40
	61.74
	62.90
	63.06
	63.13
	59.21
	62.39
	59.03

You are given two samples of observations.
You have 30 observations of a random variable
(profit of company A observed during 30 consecutive
days) and 40 observations of random variable
(profit of company B observed during 40 consecutive days).
Assume for simplicity that both variables are normally distributed ar
• Use the two sample *t*-test to test the null hypothesis that the (pop
against the two-sided alternative hypothesis that they are different.
Calculate the *p*-value.
Considering the significance level = 5 %, do you reject or fail to rej
• Use the ANOVA *F*-test to test the null hypothesis that the (populat
against the two-sided alternative hypothesis that they are different.
Calculate the *p*-value.
Considering the significance level = 1 %, do you reject or fail to rej

nd have the same variance.
ulation) means and are the same,

ect the null hypothesis?
:ion) means and are the same,

ect the null hypothesis?