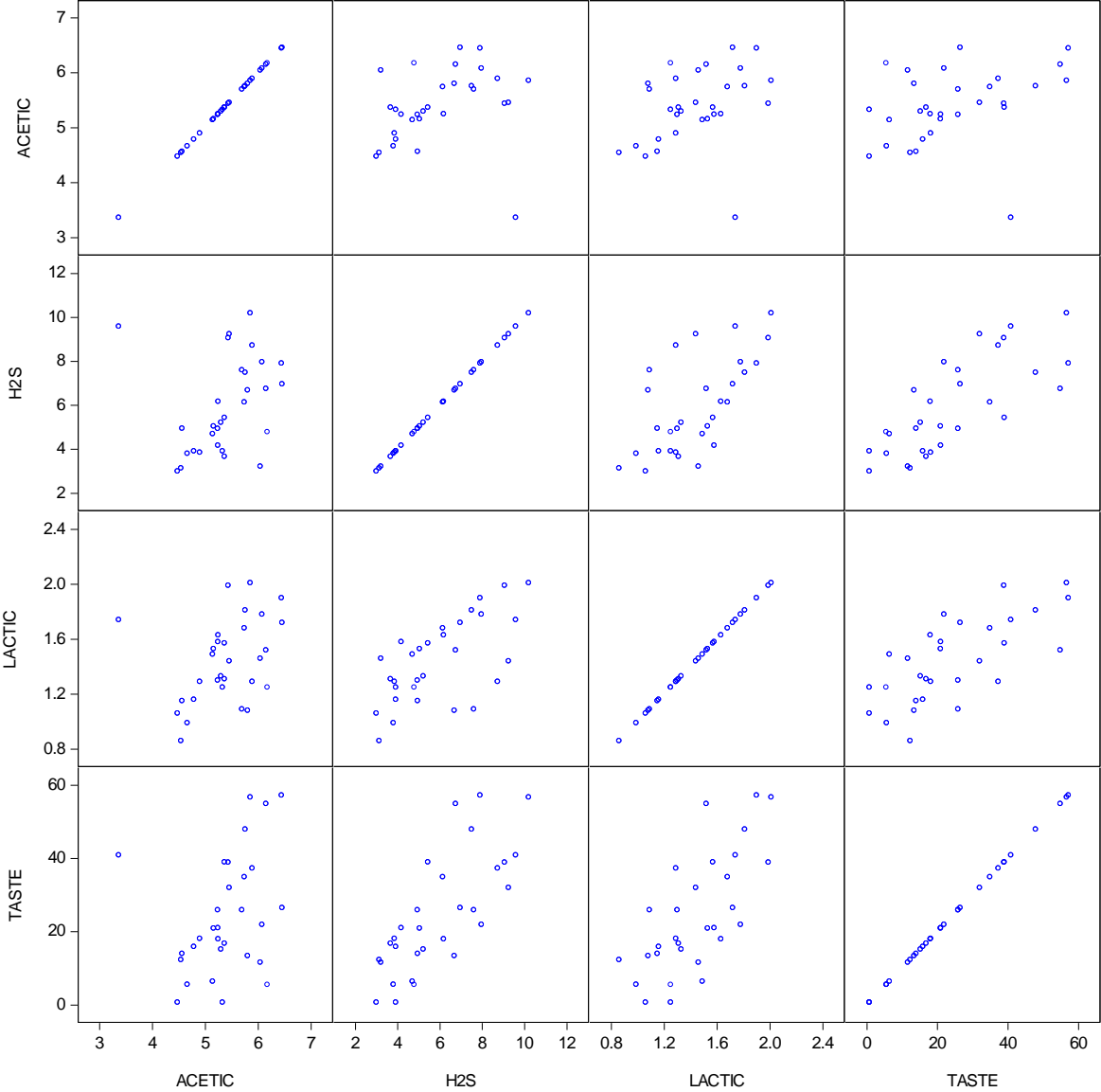# 8.30

a.

b.

Dependent Variable: TASTE
Method: Least Squares
Date: 12/09/20   Time: 14:51
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-25.67618	16.32978	-1.572353	0.1275
ACETIC	3.253508	3.113979	1.044807	0.3054
H2S	5.499416	0.980733	5.607455	0.0000

R-squared	0.587826	Mean dependent var	24.53333
Adjusted R-squared	0.557294	S.D. dependent var	16.25538
S.E. of regression	10.81570	Akaike info criterion	7.694514
Sum squared resid	3158.444	Schwarz criterion	7.834634
Log likelihood	-112.4177	Hannan-Quinn criter.	7.739340
F-statistic	19.25315	Durbin-Watson stat	1.111606
Prob(F-statistic)	0.000006		

$$\widehat{Taste_\iota} = -25.6762 + 3.2535 \times Acetic + 5.4994 \times H2S$$

从回归结果中可以看出，Acetic 的系数在 P=0.05 的显著性水平下不显著，H2S 的系数在 P=0.05 的显著性水平下显著，说明在其他条件不变的情况下，H2S 每提高 1 个百分点，Taste 分数提高平均提高 5.4994 个单位

c.

Dependent Variable: TASTE
Method: Least Squares
Date: 12/09/20   Time: 15:00
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-27.59182	8.981825	-3.071961	0.0048
LACTIC	19.88720	7.959009	2.498704	0.0188
H2S	3.946267	1.135692	3.474768	0.0017

R-squared	0.651702	Mean dependent var	24.53333
Adjusted R-squared	0.625903	S.D. dependent var	16.25538
S.E. of regression	9.942362	Akaike info criterion	7.526126
Sum squared resid	2668.965	Schwarz criterion	7.666246
Log likelihood	-109.8919	Hannan-Quinn criter.	7.570951
F-statistic	25.25995	Durbin-Watson stat	1.581086
Prob(F-statistic)	0.000001		

$$\widehat{Taste_\iota} = -27.5918 + 19.8872 \times Lactic + 3.9463 \times H2S$$

从回归结果中可以看出，Lactic 的系数在 P=0.05 的显著性水平下显著，H2S 的系数在 P=0.05 的显著性水平下显著，说明在其他条件不变的情况下，Lactic 每提高一个单位，Taste 分数平均提高 19.8872 个单位. H2S 每提高 1 个百分点，Taste 分数提高平均提高 3.9463 个单位

d.

Dependent Variable: TASTE
Method: Least Squares
Date: 12/09/20   Time: 15:04
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-34.13491	15.67628	-2.177488	0.0387
ACETIC	1.538645	3.000501	0.512796	0.6124
H2S	3.915241	1.153106	3.395386	0.0022
LACTIC	18.80235	8.342614	2.253772	0.0329

R-squared	0.655190	Mean dependent var	24.53333
Adjusted R-squared	0.615404	S.D. dependent var	16.25538
S.E. of regression	10.08091	Akaike info criterion	7.582729
Sum squared resid	2642.242	Schwarz criterion	7.769556
Log likelihood	-109.7409	Hannan-Quinn criter.	7.642497
F-statistic	16.46793	Durbin-Watson stat	1.441891
Prob(F-statistic)	0.000003		

$$\widehat{Taste_\iota} = -34.1349 + 1.5386 \times Acetic + 18.8024 \times Lactic + 3.9152 \times H2S$$

从回归结果中可以看出，Lactic 的系数在 P=0.05 的显著性水平下显著，H2S 的系数在 P=0.05 的显著性水平下显著，Acetic 的系数在 P=0.05 的显著性水平下不显著。

说明在其他条件不变的情况下，Lactic 每提高一个单位，Taste 分数平均提高 19.8024 个单位. H2S 每提高 1 个百分点，Taste 分数提高平均提高 3.9152 个单位

e.

多重共线性可能较高

相关系数法检验多重共线性

	ACETIC	LACTIC	H2S
ACETIC	1.000000	0.360733	0.270010
LACTIC	0.360733	1.000000	0.644812
H2S	0.270010	0.644812	1.000000

相关系数矩阵中 H2S 和 LACTIC 两个解释变量之间的相关系数很大，解释变量之间可能存在严重多重共线性。

做逐步回归

被解释变量对解释变量逐个做一元回归

Dependent Variable: TASTE
Method: Least Squares
Date: 12/09/20   Time: 16:39
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.40800	23.51782	-0.782725	0.4404
ACETIC	7.968280	4.331787	1.839490	0.0765

R-squared	0.107818
Adjusted R-squared	0.075954
F-statistic	3.383724
Prob(F-statistic)	0.076469

Dependent Variable: TASTE
Method: Least Squares
Date: 12/09/20   Time: 16:41
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.786837	5.957910	-1.642663	0.1116
H2S	5.776089	0.945850	6.106770	0.0000

R-squared	0.571162
Adjusted R-squared	0.555846
F-statistic	37.29265
Prob(F-statistic)	0.000001

Dependent Variable: TASTE
Method: Least Squares
Date: 12/09/20   Time: 16:42
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-29.85883	10.58232	-2.821577	0.0087
LACTIC	37.71995	7.186396	5.248799	0.0000

R-squared	0.495949
Adjusted R-squared	0.477947
F-statistic	27.54989
Prob(F-statistic)	0.000014

比较 3 个一元回归结果我们知道，TASTE 对 ACETIC 做回归的这个模型中，ACETIC 的系数在 95%置信水平下不显著，所以剔除 ACETIC 保留 H2S.

f.

应该选取 H2S 和 LACTIC 作为解释变量对被解释变量 TASTE 做回归分析。

Dependent Variable: TASTE
Method: Least Squares
Date: 12/09/20   Time: 19:00
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-27.59182	8.981825	-3.071961	0.0048
LACTIC	19.88720	7.959009	2.498704	0.0188
H2S	3.946267	1.135692	3.474768	0.0017
R-squared	0.651702	Mean dependent var		24.53333
Adjusted R-squared	0.625903	S.D. dependent var		16.25538
S.E. of regression	9.942362	Akaike info criterion		7.526126
Sum squared resid	2668.965	Schwarz criterion		7.666246
Log likelihood	-109.8919	Hannan-Quinn criter.		7.570951
F-statistic	25.25995	Durbin-Watson stat		1.581086
Prob(F-statistic)	0.000001			

$$\widehat{Taste_\iota} = -27.5918 + 19.8872 \times Lactic + 3.9463 \times H2S$$

从回归结果中可以看出，Lactic 和 H2S 的系数在 95%的置信水平下均显著，$\overline{R^2}$ 为 0.6259，模型的整体解释力较强。模型说明在其他条件不变的情况下，Lactic 每提高一单位，Taste 提高 19.8872 个单位，H2S 每提高一个百分点，Taste 提高 3.9463 个单位。