

Midterm 2

Yanlin Li

Read in the data

```
library(tidyverse)
library(tidymodels)
library(car)

beijing <- read_csv("beijing_mod.csv")
```

Exercise 2

```
m1 <- lm(SO2 ~ as.factor(season) + TEMP + PRES + TEMP * PRES, data = beijing)
summary(m1)
```

Call:

```
lm(formula = SO2 ~ as.factor(season) + TEMP + PRES + TEMP * PRES,
    data = beijing)
```

Residuals:

Min	1Q	Median	3Q	Max
-35.781	-10.622	-4.016	4.616	174.295

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	784.398352	91.394715	8.583	< 2e-16 ***
as.factor(season)spring	8.759455	1.216483	7.201	7.9e-13 ***
as.factor(season)summer	-0.943552	1.665693	-0.566	0.57113
as.factor(season)winter	16.785910	1.502738	11.170	< 2e-16 ***
TEMP	-13.537241	4.769535	-2.838	0.00457 **

```

PRES                -0.753995    0.089570   -8.418   < 2e-16 ***
TEMP:PRES           0.012671    0.004719    2.685   0.00730 **

```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 20.35 on 2493 degrees of freedom

Multiple R-squared: 0.2047, Adjusted R-squared: 0.2028

F-statistic: 107 on 6 and 2493 DF, p-value: < 2.2e-16

Exercise 3

```

beijing2 <- beijing %>%
  mutate(precipitation = ifelse(RAIN == 0.0,
    "No", "Yes"))

m2 <- lm(log10(SO2) ~ as.factor(season) + TEMP + log2(WSPM) + as.factor(precipitation) + PRES,
  data = beijing2)
summary(m2)

```

Call:

```

lm(formula = log10(SO2) ~ as.factor(season) + TEMP + log2(WSPM) +
    as.factor(precipitation) + PRES + log2(WSPM) * as.factor(season),
    data = beijing2)

```

Residuals:

Min	1Q	Median	3Q	Max
-1.23432	-0.32775	-0.03669	0.29638	1.31372

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	10.014150	1.674983	5.979	2.57e-09	***
as.factor(season)spring	0.347805	0.029992	11.597	< 2e-16	***
as.factor(season)summer	-0.163113	0.033698	-4.840	1.38e-06	***
as.factor(season)winter	0.629716	0.033206	18.964	< 2e-16	***
TEMP	-0.009499	0.001738	-5.466	5.06e-08	***
log2(WSPM)	0.006632	0.015606	0.425	0.67091	
as.factor(precipitation)Yes	-0.297062	0.043791	-6.784	1.46e-11	***
PRES	-0.009015	0.001636	-5.510	3.95e-08	***
as.factor(season)spring:log2(WSPM)	-0.094869	0.022741	-4.172	3.13e-05	***
as.factor(season)summer:log2(WSPM)	0.071168	0.026180	2.718	0.00661	**
as.factor(season)winter:log2(WSPM)	-0.239648	0.022965	-10.435	< 2e-16	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4201 on 2489 degrees of freedom

Multiple R-squared: 0.341, Adjusted R-squared: 0.3384

F-statistic: 128.8 on 10 and 2489 DF, p-value: < 2.2e-16