

ECN 3972

Lab 5

Hypothesis Tests with Multiple Linear Regression in R

Load mosaic.

In R:

```
library(mosaic)
```

Download the data TRACTOR.xls and into R.

Question 1:

How many observations do you have? How many variables do you have?

We're going to run 3 regressions, adding an independent variable each time.

First regression:

$$price_i = \beta_0 + \beta_1 HP_i + \varepsilon_i$$

where:

$price_i$ = price of tractor i

HP_i = horsepower of tractor i

In R:

```
model1 = lm(price~HP, data=TRACTOR)
```

```
summary(model1)
```

Question 2:

What sign would you expect β_1 to have? Test this hypothesis at the 5% level.

Second regression:

$$price_i = \beta_0 + \beta_1 HP_i + \beta_2 age_i + \varepsilon_i$$

where:

age_i = age of tractor i

In R:

```
model2 = lm(price~HP + age, data=TRACTOR)
```

```
summary(model2)
```

Question 3:

What sign would you expect β_2 to have? Test this hypothesis at the 5% level.

Question 4:

Provide an interpretation of the coefficient on age.

Third regression:

$$price_i = \beta_0 + \beta_1 HP_i + \beta_2 age_i + \beta_3 hours_i + \varepsilon_i$$

where:

$hours_i$ = engine hours of tractor i

In R:

```
model3 = lm(price~HP + age + hours, data=TRACTOR)
summary(model3)
```

Question 5:

What sign would you expect β_3 to have? Test this hypothesis at the 5% level.

Question 6:

Provide an interpretation of the coefficient on hours.

Question 7:

Test the overall significance for the third model (at the 5% level).