Homework 5

Elizabeth Chung, Shay Diamond, Flaka Bajraktari, Ekaterina Marbot, and Om0lara Adelaja

10/16/2018

```
x <- lm(WSAL_VAL ~ Age ** 2 + white)
stargazer(x, title = "Regression 1")
```

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu
% Date and time: Tue, Oct 16, 2018 - 15:21:13

Table 1: Regression 1

	Dependent variable:
	WSAL_VAL
Age	386.364***
	(4.644)
white	3,803.855***
	(250.173)
Constant	4,387.764***
	(273.203)
Observations	202,634
R^2	0.034
Adjusted R^2	0.034
Residual Std. Error	46,643.900 (df = 202631)
F Statistic	3,605.317*** (df = 2; 202631)
Note:	*p<0.1; **p<0.05; ***p<0.01

3. Hypothesis Tests, Conditionals (20 points)

a

a. Testing whether the fraction of immigrants of people making less than 15 and hour vs the fraction of immigrants of people making more than 15 an hour

```
n1 <- 14235 + 3113 + 3113 + 1824
x1 <- 3113 + 1824
phat1 <- x1 / n1

n2 <- 33150 + 662 + 5296 + 567
x2 <- (5296 + 567)
phat2 <- x2 / n2

pbar <- (x1 + x2) / (n1 + n2)
```

```
t.stat <- (phat1 - phat2) / sqrt( pbar * (1 - pbar) * (1/n1  + 1/n2))
critval <- pnorm(0.025)
p.val <- pnorm(-t.stat)
E <- critval * sqrt( phat1 * (1 - phat1) / n1 + phat2 * (1 - phat2 ) / n2)
point.est <- phat1 - phat2
```

$$z = 23.2265503$$
$$p\text{−value} = 1.2278041 \times 10^{-119}$$
$$E = 0.0016847$$
$$0.0720788 \leq p_1 - p_2 \leq 0.0754482$$

a. Of immigrants, the fraction who are making $15/hr vs who are making more than $15/hr. In this case we'll test the proportion of immigrants making less than $15/hr against the null hypothesis being that the proportion equals .50.

```
n <- 3113 + 1824 + 5296 + 567
phat <- (3113 + 1824) / n
p <- 0.5

critval <- -pnorm(0.005)
point.est <- phat
se.phat <- sqrt( phat * (1 - phat) / n )
se.p <- sqrt( p * (1 - p) / n )
E <- critval * se.phat
t.stat <- point.est * se.p
p.val <- pnorm(abs(t.stat)) * 2
```

$$z = 0.0021994$$
$$p\text{−value} = 1.0017548$$
$$E = -0.0024063$$
$$0.459536 \leq p \leq 0.4547233$$

b.
```
n1 <- 14235 + 3113 + 1062 + 1824
x1 <- 1062 + 1824
phat1 <- x1 / n1

n2 <- 33150 + 662 + 5296 + 567
x2 <- (662 + 567)
phat2 <- x2 / n2

pbar <- (x1 + x2) / (n1 + n2)
t.stat <- (phat1 - phat2) / sqrt( pbar * (1 - pbar) * (1/n1  + 1/n2))
critval <- pnorm(0.025)
p.val <- pnorm(-t.stat)
E <- critval * sqrt( phat1 * (1 - phat1) / n1 + phat2 * (1 - phat2 ) / n2)
point.est <- phat1 - phat2
```

$$
\begin{aligned}
z &= 51.1026065 \\
p\text{−value} &= 0 \\
E &= 0.0013299 \\
0.1103247 \leq p_1 - p_2 &\leq 0.1129844
\end{aligned}
$$

b.
```
n <- 1062 + 1824 + 662 + 567
phat <- (1062 + 1824) / n
p <- 0.5

critval <- -pnorm(0.005)
point.est <- phat
se.phat <- sqrt( phat * (1 - phat) / n )
se.p <- sqrt( p * (1 - p) / n )
E <- critval * se.phat
t.stat <- point.est * se.p
p.val <- pnorm(abs(t.stat)) * 2
```

$$
\begin{aligned}
z &= 0.0054665 \\
p\text{−value} &= 1.0043616 \\
E &= -0.0035815 \\
0.7049181 \leq p &\leq 0.697755
\end{aligned}
$$

c. `1824 / (14235 + 3113 + 1062 + 1824) ## 0.0901453`
d. `1824 / (3113 + 1824) ## 0.3694551`
e. `567 / (5296 + 567) ## 0.09670817`