**Name: Akond Rahman**

**Unity ID: aarahman**

**Section 001 B**

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**Answer to 12.10(a):**

BP = 57.3 + 5.80\* Age + 3.32 \* Weight

**Answer to 12.10(b):**

Estimated residual std. dev =√MS(residual) = √6.02 = 2.453

**Answer to 12.10(c):**

The co-efficient of weight is 3.32, and refers to the effect of changing weight is positive for BP, when age and weight is kept constant.

**Answer to 12.15(a):**

One way: F(3, 20)= 22.28

Another way = 14633.9226/656.811614 = 22.280

**Answer to 12.15(b):**

Hypotheses:

Null hypothesis: H0: beta\_1 = beta\_2 = beta\_3 = beta\_4 = 0

Alt. hypothesis: H1: at least one of **βi** is not zero for i=1, 2, 3, 4

We reject the null hypothesis with 99% statistical confidence. There is at least one correlation co-efficient that is non-zero

Thee explanatory variables collectively has some predicted value

**Answer to 12.15(c):**

T-test statistic for **β1** = 4.842

Also test statistic, TS = **β1** / s**β1** = 136.0983/28.10759 = 4.842

**Answer to 12.15(d):**

Null hypothesis: H0: **β1** = 0

Alt. hypothesis: H1: **β1** not equal to zero

Reject the null hypothesis H0

**Answer to 12.15(e):**

There is sufficient sample evidence to suggest that promo is a statistical significant predictor.

**Answer to 12.17(a):**

The hypotheses tests asserts that if all other explanatory variables had already been used in a regression model and then if an explanatory variable is added last, then will the lastly added variable have an additional predictive value.

**Answer to 12.17(b):**

Except for promo, all other explanatory variables have no additional power of the response variable.

**Answer to 12.33(a):**

90.854 , it is for the Individual fit

**Answer to 12.33(b):**

(89.316, 92.393)

**Answer to NBP1 (a):**

**ΣΛ** = MSE \* (XTX)-1

= 0.06367 \* ((3.9282 -0.6684 -.0812), (-0.6684 0.1465 -0.0098), (-0.0812 -0.0098 0.0217))

=(0.2501 -0.0425 -0.00517), (-0.0425 0.00932 -0.000623), (-0.00517 -0.000623 0.00138)

**Answer to NBP1 (b):**

**βΛ2** ± t **α**/2 \* s**β2**

= -0.0788 ± 2.579 \* 0.0371

= (-0.174147, 0.016547)

**Answer to NBP1 (c):**

X0T \* **ΣΛ** \* X0

=(1 5 3)\* ((0.2501 -0.0425 -0.00517), (-0.0425 0.00932 -0.000623), (-0.00517 -0.000623 0.00138)) \* (1 5 3)T

= (0.2209 0.002231 -0.0041) \* (1 5 3)T

= 0.02081

S.E = √(0.02081) = 0.1442

95% prediction interval

= μΛ  ± t **α**/2 \* √(0.06367 + 0.1442)

= 2.903 ± 2.57 \* 0.4559

= (0.333, 5.473)

with 95% statistical confidence we can predict that the prediction value for x1=5, x2=3 will fall within (0.333, 5.473)

**Answer to NBP1 (d):**

95% confidence interval

= μΛ  ± t **α**/2 \* S.E

= mu hat ± t5, 0.025 \* 0.1442

= 2.903 ± 2.570 \* 0.1442

= (2.5324, 3.27359)

the prediction interval is wider than the confidence interval as the formula for the prediction interval incudes MSE.