ETC 2420/5242 Quiz

SOLUTION

1. Which of these two approaches would enforce that the error for each country has the same variance? (x_1 has two levels australia, new zealand, x_2 is a quantitative variable) A or B ?? `A`

A.

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 * x_2 + \varepsilon$$

B. Fit separate models for austrlia and new zealand

$$y_i^1 = \beta_0 + \beta_1 x_2 + \varepsilon \;\; and \;\; y_i^2 = \beta_0 + \beta_1 x_2 + \varepsilon$$

2. Prediction intervals for new values are typically wider than confidence intervals for the predicted value? `TRUE`

3. Permutation samples for testing the statistical significance of a slope parameter are consistent with a sample from a population where $\beta_1 = 0$. `TRUE`

4. Write down the fitted model for this model summary.

```
#>
#> Call:
#> glm(formula = log.radon ~ basement * uranium, data = radon)
#>
#> Deviance Residuals:
#>    Min      1Q  Median      3Q     Max
#> -3.996  -0.470   0.035   0.485   2.430
#>
#> Coefficients:
#>                  Estimate Std. Error t value Pr(>|t|)
#> (Intercept)        1.4441     0.0298   48.51   <2e-16 ***
#> basement          -0.6886     0.0711   -9.69   <2e-16 ***
#> uranium            0.8463     0.0761   11.13   <2e-16 ***
#> basement:uranium  -0.4117     0.1896   -2.17     0.03 *
#> ---
#> Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
#>
#> (Dispersion parameter for gaussian family taken to be 0.5937)
#>
#>     Null deviance: 668.46  on 918  degrees of freedom
#> Residual deviance: 543.26  on 915  degrees of freedom
#> AIC: 2135
#>
#> Number of Fisher Scoring iterations: 2
```

$$\hat{log.radon} = 1.44 + 0.85 \times uranium \;\; if \;\; floor \; is \; basement$$

$$\hat{log.radon} = 0.76 + 0.43 \times uranium \;\; if \;\; floor \; is \; first \; floor$$