1. Tables

HW1

HW2

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | -2LnLike | No. | AIC | HQIC | BIC | CAIC | s |  |  |  |
| a | 50964.1 | 147 | 51258.1 | 51605.8 | 52267.6 | 52414.6 |  | 76.95 | - | - |
| b | 48061.8 | 148 | 48357.8 | 48707.8 | 49374.2 | 49522.2 |  | 51.12 | - | - |
| c | 51489.0 | 3 | 51495.0 | 51498.7 | 51504.0 | 51507.0 | 20.94 | 78.58 |  |  |
| d | 51489.0 | 3 | 51495.0 | 51498.7 | 51504.0 | 51507.0 | 20.94 | 78.58 |  |  |
| e | 48482.4 | 4 | 48490.4 | 48495.2 | 48502.3 | 48506.3 | 6.01 | 52.23 | .41 | .68 |
| f | 48482.4 | 4 | 48490.4 | 48495.2 | 48502.3 | 48506.3 | 6.01 | 52.23 | .41 | .68 |
| g | 48646.8 | 4 | 48654.8 | 48659.6 | 48666.7 | 48670.7 | 21.67 | 52.20 | .26 | .00 |
| h | 51267.2 | 4 | 51275.2 | 51280.1 | 51287.2 | 51291.2 | 3.05 | 78.62 | .18 | .78 |
| i | 48426.4 | 5 | 48436.4 | 48442.5 | 48451.3 | 48456.3 | 3.71 | 52.23 | .43 | .78 |
| j | 48363.7 | 7 | 48377.7 | 48386.2 | 48398.6 | 48405.6 | 3.75 | 51.75 | .44 | .78 |
| k | 48359.0 | 10 | 48379.0 | 48391.1 | 48408.8 | 48418.8 | 3.63 | 51.75 | .44 | .78 |
| l | 48363.5 | 8 | 48379.5 | 48389.2 | 48403.4 | 48411.4 | 3.75 | 51.75 | .44 | .78 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | -2LnLike | No. | AIC | HQIC | BIC | CAIC | s |  |  |  |
| j | 48363.7 | 7 | 48377.7 | 48386.2 | 48398.6 | 48405.6 | 3.75 | 51.75 | .44 | .78 |
| n | 48347.2 | 9 | 48365.2 | 48376.1 | 48392.0 | 48401.0 | 3.67 | 51.65 | .44 | .78 |
| o | 48338.6 | 12 | 48362.6 | 48377.2 | 48398.4 | 48410.4 | 3.38 | 51.65 | .45 | .80 |
| p | 48306.8 | 14 | 48334.8 | 48351.8 | 48376.6 | 48390.6 | 3.44  0.06  0.01 | 50.90 | .45 | .79 |
| q | 48334.1 | 14 | 48362.1 | 48379.0 | 48403.8 | 48417.8 | 3.69  -0.31  0.17 | 51.43 | .45 | .78 |
| r | 48337.7 | 14 | 48365.7 | 48382.7 | 48407.5 | 48421.5 | 4.06  -0.19  0.02 | 51.64 | .44 | .77 |
| s | 48255.4 | 18 | 48291.4 | 48313.2 | 48345.1 | 48363.1 | 3.40  0.04  0.002 | 50.90 | .45 | .80 |
| t | 48255.1 | 19 | 48293.1 | 48316.1 | 48349.8 | 48368.8 | 3.40  0.04  0.0023 | 50.90 | .45 | .80 |
| u | 48247.3 | 21 | 48289.3 | 48314.74 | 48351.9 | 48372.9 | 3.17  0.10  0.0023  -0.16  -0.02  0.13 | 50.72 | .46 | .81 |

(a)

There is no “unique best” model among random intercept models. Model (o) from HW2 has the smallest AIC (48362.6), but in terms of HQIC, BIC, and CAIC, model (n) from HW2 is the “best” model, because it has the smallest HQIC, BIC, and CAIC.

(b)

Taking all models into consideration, model (s) has the smallest AIC (48291.4), HQIC (48313.2), BIC (48345.1), and CAIC (48363.1).

(c)

Harmonic mean:

x̄+ = 146/3.627=40.25

(d)

Base on R^2 values, mode (u) from HW2 should be the best model, because it has the largest R^2 values (.46 and .81). This is not the same when we use information criterion, based on which model (s) is the best model.

(e)

R21: Compared with the null model, when predictors such as group centered math, gender, grade, hours watching TV, community type are included, the proportional reduction in squared prediction errors of Yij is 45%.

R22: Compared with the null model, Compared with the null model, when predictors such as group centered math, gender, grade, hours watching TV, community type are included, the proportional reduction in squared prediction errors of group means Y-barj is 80%.

2.

H0 :  == 0;

H1: Not H0.

= 48261.3-48255.4 =5.9