**Slide 1:**

We are going to present Problem 2C, and in this problem we are asked to consider the model that is fitted with code you can see on the slide.

**Slide 2:**

We want to compare this model to the model from problem 2a. First, we explain the mathematical differences between the models. Then, we look at the predictions from the models, and see if there are any significant differences. At last, we will try to explain the results we get.

**Slide 3:**

In the slide, we can see the mathematical formulation of the two models. We can see that we include an intercept term in the model. We use the default prior on the intercept term which is a Gaussian distribution with mean 0 and precision 0. The prior for sigma squared is set to be the same as in 2a. This means that we place loggamma with alpha=2 and beta=0.05 on the log-precision as we did in 2a. A difference from the model in 2a is that we use constraint=True instead of constraint=FALSE as in 2a. This means that we have a sum-to-zero constraint. As you can see in the slide, this means that the sum of the tau-values is set to be zero.

**Slide 4:**

As you can see from the plot, the predicted tau-values are different for the two models. The model with the intercept and sum-to-zero constraint is supposed to have tau-values that sum to zero, and from the figure it seems like that could the case. The model without intercept does not have tau-values that sums to zero as seen in the figure. Nevertheless, we can see that the to graphs have about the same shape.

**Slide 5:**

In this plot, we can see the predicted values of pi. We can see no significant differences of predicted values of pi.

**Slide 6:**

And to further show how similar the predictions are, we can look at pi for day 201 and pi for day 366 which are very similar. The first difference can be seen in the fifth decimal.

**Slide 7: Explanation**

The reason for the different predicted tau-values is because of the different constraints. However, the intercept term in the model with the constraint shifts up the values such that the predicted values of pi are almost identical for the two models. The intercept term makes the model as flexible as the model in 2a, and this lead to the same fitted values. If this intercept term wasn’t included, the model would be constrained by the sum-to zero constraint and we would get different predictions. This can also be shown more formally by looking at the marginal posterior distributions. This can be done to get a better understanding of why the predictions are so similar..

**Slide 8: Conclusion**

So, in conclusion we have seen that the model we consider in this problem has an intercept term and sum-to-zero constraint which is different from the model in 2a. We have also seen that the can’t see any significant differences between the predictions of the two model, and the reasons for that is that the intercept term makes the model as flexible as the model in 2a, and this leads to the same predictions.

**Slide 9:**

Do you have any questions?