1. (a)

Looking at the dataset, we can see that as time passes, the temperature rises and reaches a maximum value. The temperature decreases after its maximum as the time passes.

The slope might be either positive or negative. As a result, I select the normal distribution as the prior of slope.

In terms of the intercept, I chose the normal distribution as the prior.

Given that our dataset contains missing values, Bayesian R2 is calculated and shown below.

Therefore, given the predictor variable time, my model would be below:

Temp= 102.636 -0.173 \* time

The Bayesian R^2= 0.028, it is relatively low.

The estimator of the missing data is 102.636 given the estimated model.

Looking at the last picture, it shows that 95% credible interval for the slope contains 0.

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(b) In this part, I choose the normal distribution as the priors for all coefficients. The b0 and b1 are set as normal distribution with mean 0 and variance 1 whereas the alpha is set as normal distribution with mean of response variable y and variance 1. The likelihood is set as half Cauchy distribution that it displays the nonzero probability density for values greater than or equal to mean.

The estimated quadratic model is shown below:

Temp=94.229 +0.141 \* time -0.003 \* time^2

The estimator of the missing data is 94.229.

The BR2 is 0.042, which is slightly better than that in the linear model in part a.

The 95% credible set for b0 and b1 in the quadratic model contain 0, respectively. But the 95% credible set for alpha and error do not contain 0.

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2.

(a) Looking at the results below, we can observe that the 90% Credible Set for is not all positive.

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(b) Looking at the results below, we can observe that the posterior probability of hypothesis is 0.446.

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(c) Given the obtained results above, we can conclude that the treatment for this cancer is not effective because there is no significant difference between the placebo group and treatment group.