# Week 9: Hierarchical GLM

18/03/24

## Lip cancer

Here is the lip cancer data that was used in the lecture.

- `aff.i` is proportion of male population working outside in each region
- `observe.i` is observed deaths in each region
- `expect.i` is expected deaths, based on region-specific age distribution and national-level age-specific mortality rates.

```
observe.i <- c(
  5,13,18,5,10,18,29,10,15,22,4,11,10,22,13,14,17,21,25,6,11,21,13,5,19,18,14,17,3,10,
  7,3,12,11,6,16,13,6,9,10,4,9,11,12,23,18,12,7,13,12,12,13,6,14,7,18,13,9,6,8,7,6,16,4,6,
  17,5,7,2,9,7,6,12,13,17,5,5,6,12,10,16,10,16,15,18,6,12,6,8,33,15,14,18,25,14,2,73,13,14
  12,10,3,11,3,11,13,11,13,10,5,18,10,23,5,9,2,11,9,11,6,11,5,19,15,4,8,9,6,4,4,2,12,12,11
  8,12,11,23,7,16,46,9,18,12,13,14,14,3,9,15,6,13,13,12,8,11,5,9,8,22,9,2,10,6,10,12,9,11,
  9,11,11,0,9,3,11,11,11,5,4,8,9,30,110)
expect.i <- c(
    6.17,8.44,7.23,5.62,4.18,29.35,11.79,12.35,7.28,9.40,3.77,3.41,8.70,9.57,8.18,4.35,
    4.91,10.66,16.99,2.94,3.07,5.50,6.47,4.85,9.85,6.95,5.74,5.70,2.22,3.46,4.40,4.05,5.74
    16.99,6.19,5.56,11.69,4.69,6.25,10.84,8.40,13.19,9.25,16.98,8.39,2.86,9.70,12.12,12.94
    10.34,5.09,3.29,17.19,5.42,11.39,8.33,4.97,7.14,6.74,17.01,5.80,4.84,12.00,4.50,4.39,1
    6.42,5.26,4.59,11.86,4.05,5.48,13.13,8.72,2.87,2.13,4.48,5.85,6.67,6.11,5.78,12.31,10.
    2.52,6.22,14.29,5.71,37.93,7.81,9.86,11.61,18.52,12.28,5.41,61.96,8.55,12.07,4.29,19.4
    12.90,4.76,5.56,11.11,4.76,10.48,13.13,12.94,14.61,9.26,6.94,16.82,33.49,20.91,5.32,6.
    12.94,16.07,8.87,7.79,14.60,5.10,24.42,17.78,4.04,7.84,9.89,8.45,5.06,4.49,6.25,9.16,1
    9.57,5.83,9.21,9.64,9.09,12.94,17.42,10.29,7.14,92.50,14.29,15.61,6.00,8.55,15.22,18.4
    18.37,13.16,7.69,14.61,15.85,12.77,7.41,14.86,6.94,5.66,9.88,102.16,7.63,5.13,7.58,8.0
    18.75,12.33,5.88,64.64,8.62,12.09,11.11,14.10,10.48,7.00,10.23,6.82,15.71,9.65,8.59,8.
    12.31,8.91,50.10,288.00)
aff.i <- c(0.2415,0.2309,0.3999,0.2977,0.3264,0.3346,0.4150,0.4202,0.1023,0.1752,
```

```
0.2548,0.3248,0.2287,0.2520,0.2058,0.2785,0.2528,0.1847,0.3736,0.2411,
0.3700,0.2997,0.2883,0.2427,0.3782,0.1865,0.2633,0.2978,0.3541,0.4176,
0.2910,0.3431,0.1168,0.2195,0.2911,0.4297,0.2119,0.2698,0.0874,0.3204,
0.1839,0.1796,0.2471,0.2016,0.1560,0.3162,0.0732,0.1490,0.2283,0.1187,
0.3500,0.2915,0.1339,0.0995,0.2355,0.2392,0.0877,0.3571,0.1014,0.0363,
0.1665,0.1226,0.2186,0.1279,0.0842,0.0733,0.0377,0.2216,0.3062,0.0310,
0.0755,0.0583,0.2546,0.2933,0.1682,0.2518,0.1971,0.1473,0.2311,0.2471,
0.3063,0.1526,0.1487,0.3537,0.2753,0.0849,0.1013,0.1622,0.1267,0.2376,
0.0737,0.2755,0.0152,0.1415,0.1344,0.1058,0.0545,0.1047,0.1335,0.3134,
0.1326,0.1222,0.1992,0.0620,0.1313,0.0848,0.2687,0.1396,0.1234,0.0997,
0.0694,0.1022,0.0779,0.0253,0.1012,0.0999,0.0828,0.2950,0.0778,0.1388,
0.2449,0.0978,0.1144,0.1038,0.1613,0.1921,0.2714,0.1467,0.1783,0.1790,
0.1482,0.1383,0.0805,0.0619,0.1934,0.1315,0.1050,0.0702,0.1002,0.1445,
0.0353,0.0400,0.1385,0.0491,0.0520,0.0640,0.1017,0.0837,0.1462,0.0958,
0.0745,0.2942,0.2278,0.1347,0.0907,0.1238,0.1773,0.0623,0.0742,0.1003,
0.0590,0.0719,0.0652,0.1687,0.1199,0.1768,0.1638,0.1360,0.0832,0.2174,
0.1662,0.2023,0.1319,0.0526,0.0287,0.0405,0.1616,0.0730,0.1005,0.0743,
0.0577,0.0481,0.1002,0.0433,0.0838,0.1124,0.2265,0.0436,0.1402,0.0313,
0.0359,0.0696,0.0618,0.0932,0.0097)
```

## Question 1

Explain a bit more what the `expect.i` variable is. For example, if a particular area has an expected deaths of 16, what does this mean?

The expected death is the expected number of lip cancer deaths of a particular region given that region's age distribution and the national level age-specific mortality rates. For example, let's say an implied number of deaths of 19, this means that based on the area's age distribution, we would expect an average death of 19 if this region were to experience the same age specific mortality rate as the national level.

## Question 2

Run four different models in Stan with three different set-ups for estimating $\theta_i$, that is the relative risk of lip cancer in each region:

1. Intercept $\alpha_i$ is same in each region $= \alpha$
2. Intercept $\alpha_i$ is different in each region and modeled separately
3. Intercept $\alpha_i$ is different in each region and the intercept is modeled hierarchically

Note in all three cases, use the proportion of male population working outside in each region as a covariate.

Given:

$$u_i|\theta_i \sim \text{Poisson}(\theta_i \cdot e_i)$$

Model 1 (Intercept $\alpha_i$ is same in each region $= \alpha$ ):

$$\text{Model 1: } \log\theta_i = \alpha + \beta x_i$$

Model 2 (Intercept $\alpha_i$ is different in each region and modeled separately):

$$\text{Model 2: } \log\theta_i = \alpha_i + \beta x_i$$

Model 3 (Intercept $\alpha_i$ is different in each region and the intercept is modeled hierarchically):

$$\text{Model 3: } \log\theta_i = \alpha_i + \beta x_i$$

and

$$\alpha_i \sim N(\mu, \sigma^2)$$

```
# Load packages
library(rstan)
library(tidybayes)
library(tidyverse)

stan_data <- list(N = length(observe.i),
                  log_y = log(expect.i),
                  x = aff.i - mean(aff.i),
                  y = observe.i)
```

```
model1 <- stan(data = stan_data,
               file = "model1.stan",
               iter = 2000,
               seed = 2201)
```

```
Running /Library/Frameworks/R.framework/Resources/bin/R CMD SHLIB foo.c
using C compiler: 'Apple clang version 15.0.0 (clang-1500.3.9.4)'
using SDK: 'MacOSX14.4.sdk'
clang -arch arm64 -I"/Library/Frameworks/R.framework/Resources/include" -DNDEBUG   -I"/Libra
In file included from <built-in>:1:
In file included from /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/St
In file included from /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/Rc
```

```
In file included from /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/R
/Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/RcppEigen/include/Eigen/
#include <cmath>
         ^~~~~~~
1 error generated.
make: *** [foo.o] Error 1

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 1).
Chain 1:
Chain 1: Gradient evaluation took 2.4e-05 seconds
Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 0.24 seconds.
Chain 1: Adjust your expectations accordingly!
Chain 1:
Chain 1:
Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 1:
Chain 1:  Elapsed Time: 0.036 seconds (Warm-up)
Chain 1:                0.035 seconds (Sampling)
Chain 1:                0.071 seconds (Total)
Chain 1:

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 2).
Chain 2:
Chain 2: Gradient evaluation took 6e-06 seconds
Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0.06 seconds.
Chain 2: Adjust your expectations accordingly!
Chain 2:
Chain 2:
Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
```

```
Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 2:
Chain 2:  Elapsed Time: 0.037 seconds (Warm-up)
Chain 2:                0.032 seconds (Sampling)
Chain 2:                0.069 seconds (Total)
Chain 2:

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 3).
Chain 3:
Chain 3: Gradient evaluation took 7e-06 seconds
Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 0.07 seconds.
Chain 3: Adjust your expectations accordingly!
Chain 3:
Chain 3:
Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 3:
Chain 3:  Elapsed Time: 0.035 seconds (Warm-up)
Chain 3:                0.031 seconds (Sampling)
Chain 3:                0.066 seconds (Total)
Chain 3:

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 4).
Chain 4:
Chain 4: Gradient evaluation took 6e-06 seconds
Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 0.06 seconds.
```

```
Chain 4: Adjust your expectations accordingly!
Chain 4:
Chain 4:
Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 4:
Chain 4:  Elapsed Time: 0.036 seconds (Warm-up)
Chain 4:                0.032 seconds (Sampling)
Chain 4:                0.068 seconds (Total)
Chain 4:
```

```r
summary_model1 <- summary(model1)

estimators <- summary_model1$summary[c("alpha", "beta"), ]
print(estimators)
```

```
             mean      se_mean         sd        2.5%         25%           50%
alpha -0.008964154 0.0003314989 0.02061393 -0.04987892 -0.02260942 -0.008887065
beta   2.425490910 0.0030100116 0.17280214  2.09133183  2.30974450  2.425572411
              75%      97.5%    n_eff      Rhat
alpha 0.004892112 0.03082736 3866.849 0.9996763
beta  2.544097677 2.75597635 3295.808 0.9996227
```

```r
stan_data <- list(N = length(observe.i),
                  log_y = log(expect.i),
                  x = aff.i - mean(aff.i),
                  y = observe.i)

model2 <- stan(data = stan_data,
               file = "model2.stan",
               iter = 2000,
```

```
                seed = 2201)
```

```
Running /Library/Frameworks/R.framework/Resources/bin/R CMD SHLIB foo.c
using C compiler: ‘Apple clang version 15.0.0 (clang-1500.3.9.4)’
using SDK: ‘MacOSX14.4.sdk’
clang -arch arm64 -I"/Library/Frameworks/R.framework/Resources/include" -DNDEBUG   -I"/Libra
In file included from <built-in>:1:
In file included from /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/St
In file included from /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/Rc
In file included from /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/Rc
/Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/RcppEigen/include/Eigen/
#include <cmath>
         ^~~~~~~
1 error generated.
make: *** [foo.o] Error 1

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 1).
Chain 1:
Chain 1: Gradient evaluation took 3.4e-05 seconds
Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 0.34 seconds.
Chain 1: Adjust your expectations accordingly!
Chain 1:
Chain 1:
Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 1:
Chain 1:  Elapsed Time: 0.141 seconds (Warm-up)
Chain 1:                0.135 seconds (Sampling)
Chain 1:                0.276 seconds (Total)
Chain 1:

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 2).
```

```
Chain 2:
Chain 2: Gradient evaluation took 8e-06 seconds
Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0.08 seconds.
Chain 2: Adjust your expectations accordingly!
Chain 2:
Chain 2:
Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 2:
Chain 2:  Elapsed Time: 0.138 seconds (Warm-up)
Chain 2:                0.134 seconds (Sampling)
Chain 2:                0.272 seconds (Total)
Chain 2:

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 3).
Chain 3:
Chain 3: Gradient evaluation took 7e-06 seconds
Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 0.07 seconds.
Chain 3: Adjust your expectations accordingly!
Chain 3:
Chain 3:
Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
```

```
Chain 3:
Chain 3:  Elapsed Time: 0.139 seconds (Warm-up)
Chain 3:                0.136 seconds (Sampling)
Chain 3:                0.275 seconds (Total)
Chain 3:

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 4).
Chain 4:
Chain 4: Gradient evaluation took 7e-06 seconds
Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 0.07 seconds.
Chain 4: Adjust your expectations accordingly!
Chain 4:
Chain 4:
Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 4:
Chain 4:  Elapsed Time: 0.141 seconds (Warm-up)
Chain 4:                0.136 seconds (Sampling)
Chain 4:                0.277 seconds (Total)
Chain 4:
```

```r
summary_model2 <- summary(model2)

alpha_2 <- summary_model2$summary
beta_2 <- summary_model2$summary[c("beta"), ]

print(alpha_2)
```

```
                      mean     se_mean         sd          2.5%
alpha[1]       -3.373842e-01 0.005212229 0.40760904 -1.189119e+00
alpha[2]        2.811114e-01 0.003276792 0.27073126 -2.850581e-01
```

```
alpha[3]         5.128625e-01 0.005263073 0.26982432 -3.091787e-02
alpha[4]        -3.238644e-01 0.005016097 0.41546802 -1.195638e+00
alpha[5]         5.305253e-01 0.005064881 0.32263375 -1.581158e-01
alpha[6]        -7.223495e-01 0.004283772 0.24600160 -1.222594e+00
alpha[7]         5.052704e-01 0.005449110 0.23586589  4.379384e-02
alpha[8]        -5.685673e-01 0.005970822 0.33550597 -1.238527e+00
alpha[9]         7.335528e-01 0.003051111 0.26241101  1.816897e-01
alpha[10]        7.792072e-01 0.002476525 0.21110884  3.505369e-01
alpha[11]       -1.325055e-01 0.005018492 0.45197910 -1.055601e+00
alpha[12]        8.184027e-01 0.004072891 0.31424371  1.671705e-01
alpha[13]        6.771754e-03 0.003610204 0.30358682 -6.371094e-01
alpha[14]        6.547094e-01 0.003017320 0.22036356  1.974922e-01
alpha[15]        3.416154e-01 0.003182848 0.27830068 -2.289725e-01
alpha[16]        9.022088e-01 0.004041179 0.27610063  3.269383e-01
alpha[17]        1.021498e+00 0.003080678 0.25141459  5.183295e-01
alpha[18]        6.005531e-01 0.002370221 0.21640418  1.492813e-01
alpha[19]        6.106741e-02 0.005073352 0.23486685 -4.084250e-01
alpha[20]        4.530206e-01 0.004512651 0.39705132 -3.712215e-01
alpha[21]        8.527779e-01 0.004977533 0.32426149  1.943877e-01
alpha[22]        1.070068e+00 0.003499510 0.23670240  5.921071e-01
alpha[23]        4.444780e-01 0.004402087 0.28739650 -1.585664e-01
alpha[24]       -1.348655e-01 0.005118113 0.41739342 -1.040615e+00
alpha[25]        3.058432e-01 0.005037788 0.26017108 -2.332301e-01
alpha[26]        8.489738e-01 0.002768352 0.23944144  3.507539e-01
alpha[27]        6.720103e-01 0.003374679 0.26346463  1.343016e-01
alpha[28]        8.243338e-01 0.003784849 0.25128111  3.030587e-01
alpha[29]       -7.788716e-02 0.006860967 0.51536737 -1.184001e+00
alpha[30]        5.930422e-01 0.005574373 0.33930570 -1.120848e-01
alpha[31]        1.838868e-01 0.004326152 0.37973457 -6.161456e-01
alpha[32]       -5.221077e-01 0.006178924 0.48500653 -1.562426e+00
alpha[33]        7.049190e-01 0.003459715 0.28922735  1.001581e-01
alpha[34]        3.890306e-01 0.003171578 0.29710640 -2.240092e-01
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| alpha[49] | 1.561950e-01 | 0.002988724 | 0.27399633 | -4.119147e-01 |
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| alpha[51] | -3.573768e-01 | 0.004856242 | 0.30783040 | -9.730927e-01 |
| alpha[52] | 6.289760e-02 | 0.003949412 | 0.27605328 | -5.132715e-01 |
| alpha[53] | -4.830013e-01 | 0.004559012 | 0.37555999 | -1.259170e+00 |
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| alpha[59] | -2.672695e-01 | 0.005158135 | 0.39009195 | -1.067867e+00 |
| alpha[60] | 5.275828e-01 | 0.004655340 | 0.37068942 | -2.567381e-01 |
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| alpha[62] | -1.026911e-01 | 0.004424918 | 0.39018750 | -8.964213e-01 |
| alpha[63] | -1.568544e-01 | 0.003134444 | 0.25512146 | -6.988691e-01 |
| alpha[64] | -3.365599e-01 | 0.005286632 | 0.44552096 | -1.317997e+00 |
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log_theta[57]    7.643318e-01 0.003575237 0.28815937  1.515609e-01
log_theta[58]   -2.264600e-01 0.003554517 0.30524595 -8.595387e-01
log_theta[59]   -3.629837e-01 0.005032734 0.38823636 -1.172033e+00
log_theta[60]    3.366577e-01 0.003908006 0.36390965 -4.453016e-01
log_theta[61]   -7.824893e-02 0.004111023 0.35640643 -8.279590e-01
log_theta[62]   -1.673995e-01 0.004278430 0.38927435 -9.677029e-01
log_theta[63]   -8.115969e-02 0.002956137 0.25350833 -6.125358e-01
log_theta[64]   -3.935170e-01 0.005262408 0.44575521 -1.368567e+00
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log_theta[65]    1.023186e-01 0.004620183 0.38796479 -7.271653e-01
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log_theta[67]   -1.869253e-02 0.005082748 0.42593923 -9.206711e-01
log_theta[68]    4.706056e-02 0.004702098 0.41468969 -8.348037e-01
log_theta[69]    1.848287e-02 0.002587090 0.24038800 -4.738254e-01
log_theta[70]   -2.502926e-01 0.004470762 0.41094329 -1.136506e+00
log_theta[71]    7.000198e-03 0.003736589 0.35900861 -7.520853e-01
log_theta[72]   -8.198128e-01 0.005778145 0.54565761 -1.993178e+00
log_theta[73]    5.691862e-01 0.003724797 0.32528958 -1.221154e-01
log_theta[74]   -4.901230e-01 0.003991466 0.34350365 -1.199596e+00
log_theta[75]    2.733536e-01 0.004601700 0.39676414 -5.616018e-01
log_theta[76]    6.991187e-01 0.003161849 0.28473205  1.065665e-01
log_theta[77]   -4.062724e-02 0.003000786 0.26859501 -6.029928e-01
log_theta[78]    5.984988e-01 0.002588116 0.23446574  1.179317e-01
log_theta[79]    4.063891e-01 0.005024654 0.42734109 -5.105809e-01
log_theta[80]    6.509941e-01 0.004756180 0.43808358 -2.823997e-01
log_theta[81]    2.145837e-01 0.004278280 0.39576237 -6.138394e-01
log_theta[82]    6.268973e-01 0.003153850 0.28148703  5.384172e-02
log_theta[83]    3.186778e-01 0.003575218 0.31204505 -3.337860e-01
log_theta[84]    8.913052e-01 0.002611553 0.24489993  3.805793e-01
log_theta[85]    4.683255e-01 0.003490212 0.31195699 -1.856007e-01
log_theta[86]    2.144074e-01 0.002636555 0.24031869 -2.774415e-01
log_theta[87]    2.910605e-01 0.002752573 0.25927534 -2.426995e-01
log_theta[88]    5.135353e-01 0.002673202 0.23383287  2.550630e-02
log_theta[89]    6.631985e-01 0.004753129 0.39246230 -1.583513e-01
log_theta[90]    5.799392e-01 0.003019841 0.29021882 -6.829714e-03
log_theta[91]   -8.248761e-01 0.004200564 0.36742077 -1.615900e+00
log_theta[92]    2.612219e-01 0.003983366 0.35239197 -4.492214e-01
log_theta[93]   -1.541353e-01 0.001783600 0.17187149 -5.170186e-01
log_theta[94]    5.779123e-01 0.002806566 0.25905949  3.707618e-02
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log_theta[96]    3.804954e-01 0.002695246 0.23548728 -1.020408e-01
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log_theta[98]    8.550479e-02 0.002780763 0.25648665 -4.327476e-01
log_theta[99]   -8.150476e-01 0.006080085 0.55244753 -1.994497e+00
log_theta[100]   1.578642e-01 0.001204343 0.11930461 -8.483503e-02
log_theta[101]   3.565041e-01 0.002906339 0.27232478 -1.913575e-01
log_theta[102]   1.035939e-01 0.002809906 0.26328614 -4.406192e-01
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log_theta[104]  -3.699011e-03 0.002315365 0.22244131 -4.683286e-01
log_theta[105]  -8.435812e-02 0.003657425 0.34215007 -8.286801e-01
log_theta[106]  -1.135436e-01 0.003209861 0.28317536 -6.960483e-01
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log_theta[113]  -1.978822e-01 0.003406523 0.29674866 -8.164221e-01
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log_theta[119]   6.363412e-02 0.002243711 0.20921398 -3.482174e-01
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log_theta[126]  -2.787250e-01 0.004339244 0.38885287 -1.097656e+00
log_theta[127]  -2.791220e-01 0.003358877 0.28406401 -8.650506e-01
log_theta[128]  -8.640955e-02 0.004896171 0.41656687 -9.751268e-01
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log_theta[130]  -1.898847e-01 0.002807075 0.25757448 -7.190349e-01
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log_theta[133]  -1.469772e-01 0.003577312 0.33413066 -8.257302e-01
log_theta[134]  -3.695049e-01 0.004389339 0.38436260 -1.150704e+00
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log_theta[147]   2.408622e-01 0.002325179 0.20734550 -1.840640e-01
log_theta[148]  -4.064662e-01 0.004171210 0.35816326 -1.164924e+00
log_theta[149]   7.313383e-01 0.002745721 0.25674822  2.154710e-01
log_theta[150]  -6.940061e-01 0.001530091 0.14463037 -9.826789e-01
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log_theta[153]   6.082226e-01 0.003203794 0.29107303  2.231547e-02
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log_theta[175]  -4.634264e-01 0.003316822 0.28257642 -1.064880e+00
log_theta[176]  -3.479436e-01 0.003709897 0.32400712 -1.044210e+00
log_theta[177]   5.293762e-01 0.003215446 0.30016703 -8.862521e-02
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log_theta[183]  -2.405542e-03 0.003201736 0.29143545 -5.968917e-01
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log_theta[191]  -4.449639e-01 0.004914455 0.42813363 -1.362514e+00
log_theta[192]  -4.479755e-01 0.003536172 0.34795893 -1.171602e+00
log_theta[193]  -4.946772e-02 0.003618069 0.32809383 -7.410139e-01
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| log_theta[194] | -5.145355e-01 | 0.001911401 | 0.17996357 | -8.905797e-01 |
| log_theta[195] | -9.601813e-01 | 0.001029687 | 0.09372857 | -1.147298e+00 |
| log_lambda[1] | 1.591501e+00 | 0.004975845 | 0.40645082 | 7.431625e-01 |
| log_lambda[2] | 2.507778e+00 | 0.003026627 | 0.26873450 | 1.949407e+00 |
| log_lambda[3] | 2.831954e+00 | 0.002683886 | 0.24025647 | 2.334419e+00 |
| log_lambda[4] | 1.593848e+00 | 0.004541168 | 0.40969097 | 7.221676e-01 |
| log_lambda[5] | 2.194192e+00 | 0.003701768 | 0.30958711 | 1.542852e+00 |
| log_lambda[6] | 2.902292e+00 | 0.002450455 | 0.22686976 | 2.430495e+00 |
| log_lambda[7] | 3.335458e+00 | 0.001892978 | 0.18548766 | 2.961989e+00 |
| log_lambda[8] | 2.315630e+00 | 0.003235256 | 0.30953686 | 1.687173e+00 |
| log_lambda[9] | 2.624286e+00 | 0.002777442 | 0.25964403 | 2.072081e+00 |
| log_lambda[10] | 3.032138e+00 | 0.002466572 | 0.21102966 | 2.601553e+00 |
| log_lambda[11] | 1.323208e+00 | 0.004836002 | 0.45009703 | 3.933945e-01 |
| log_lambda[12] | 2.276131e+00 | 0.003192508 | 0.30336399 | 1.635019e+00 |
| log_lambda[13] | 2.260561e+00 | 0.003363638 | 0.30062855 | 1.621287e+00 |
| log_lambda[14] | 3.037886e+00 | 0.002294556 | 0.21437959 | 2.593996e+00 |
| log_lambda[15] | 2.500282e+00 | 0.003066743 | 0.27703562 | 1.930909e+00 |
| log_lambda[16] | 2.535685e+00 | 0.003068296 | 0.26893020 | 1.971119e+00 |
| log_lambda[17] | 2.738486e+00 | 0.002637219 | 0.24741779 | 2.242250e+00 |
| log_lambda[18] | 2.993166e+00 | 0.002331749 | 0.21618182 | 2.543317e+00 |
| log_lambda[19] | 3.196080e+00 | 0.002181538 | 0.20163239 | 2.778718e+00 |
| log_lambda[20] | 1.640032e+00 | 0.004293667 | 0.39522776 | 8.214594e-01 |
| log_lambda[21] | 2.271578e+00 | 0.003187212 | 0.30582654 | 1.639073e+00 |
| log_lambda[22] | 2.969122e+00 | 0.002277511 | 0.22407480 | 2.509261e+00 |
| log_lambda[23] | 2.489287e+00 | 0.003369956 | 0.27854996 | 1.901109e+00 |
| log_lambda[24] | 1.555055e+00 | 0.004939440 | 0.41561048 | 6.582728e-01 |
| log_lambda[25] | 2.902430e+00 | 0.002484959 | 0.23009900 | 2.418975e+00 |
| log_lambda[26] | 2.816463e+00 | 0.002726477 | 0.23945993 | 2.318016e+00 |
| log_lambda[27] | 2.560539e+00 | 0.002773140 | 0.26010565 | 2.015901e+00 |
| log_lambda[28] | 2.756327e+00 | 0.002655044 | 0.24060224 | 2.245577e+00 |
| log_lambda[29] | 9.934880e-01 | 0.006086315 | 0.50953280 | -8.840781e-02 |
| log_lambda[30] | 2.201050e+00 | 0.003133811 | 0.31255085 | 1.539026e+00 |
| log_lambda[31] | 1.847073e+00 | 0.003854919 | 0.37376365 | 1.061103e+00 |
| log_lambda[32] | 1.134389e+00 | 0.005883806 | 0.48247301 | 8.961904e-02 |
| log_lambda[33] | 2.379187e+00 | 0.003384582 | 0.28755875 | 1.766665e+00 |
| log_lambda[34] | 2.316070e+00 | 0.003022148 | 0.29593180 | 1.704167e+00 |
| log_lambda[35] | 1.732914e+00 | 0.004826482 | 0.38594005 | 9.203066e-01 |
| log_lambda[36] | 2.771849e+00 | 0.002526517 | 0.24020914 | 2.281862e+00 |
| log_lambda[37] | 2.483564e+00 | 0.002936422 | 0.27572012 | 1.912639e+00 |
| log_lambda[38] | 1.731587e+00 | 0.004384224 | 0.38814616 | 9.160044e-01 |
| log_lambda[39] | 2.166726e+00 | 0.003745730 | 0.32283315 | 1.496014e+00 |
| log_lambda[40] | 2.209727e+00 | 0.003500756 | 0.31269021 | 1.555701e+00 |
| log_lambda[41] | 1.413731e+00 | 0.004873830 | 0.42992525 | 5.203791e-01 |

| | | | | |
|---|---|---|---|---|
| log_lambda[42] | 2.175129e+00 | 0.003474758 | 0.30707563 | 1.533391e+00 |
| log_lambda[43] | 2.349577e+00 | 0.002922010 | 0.29122342 | 1.727205e+00 |
| log_lambda[44] | 2.464252e+00 | 0.002991487 | 0.27649356 | 1.895328e+00 |
| log_lambda[45] | 3.074302e+00 | 0.002223588 | 0.20721798 | 2.652537e+00 |
| log_lambda[46] | 2.869117e+00 | 0.002591805 | 0.23661123 | 2.377631e+00 |
| log_lambda[47] | 2.410634e+00 | 0.003237205 | 0.28491216 | 1.814787e+00 |
| log_lambda[48] | 1.759034e+00 | 0.004546377 | 0.38476505 | 9.504369e-01 |
| log_lambda[49] | 2.518202e+00 | 0.002768287 | 0.27219439 | 1.958832e+00 |
| log_lambda[50] | 2.444895e+00 | 0.003207728 | 0.27957185 | 1.855531e+00 |
| log_lambda[51] | 2.470818e+00 | 0.003198682 | 0.29017297 | 1.871300e+00 |
| log_lambda[52] | 2.524527e+00 | 0.002994746 | 0.26765234 | 1.970251e+00 |
| log_lambda[53] | 1.804837e+00 | 0.004498103 | 0.37503288 | 1.034524e+00 |
| log_lambda[54] | 2.533235e+00 | 0.002906784 | 0.26241325 | 2.005107e+00 |
| log_lambda[55] | 1.798914e+00 | 0.004679052 | 0.37865666 | 1.003303e+00 |
| log_lambda[56] | 2.874773e+00 | 0.002627305 | 0.22694008 | 2.404744e+00 |
| log_lambda[57] | 2.454428e+00 | 0.003575237 | 0.28815937 | 1.841657e+00 |
| log_lambda[58] | 2.206276e+00 | 0.003554517 | 0.30524595 | 1.573197e+00 |
| log_lambda[59] | 1.756880e+00 | 0.005032734 | 0.38823636 | 9.478300e-01 |
| log_lambda[60] | 1.940078e+00 | 0.003908006 | 0.36390965 | 1.158118e+00 |
| log_lambda[61] | 1.887464e+00 | 0.004111023 | 0.35640643 | 1.137754e+00 |
| log_lambda[62] | 1.740660e+00 | 0.004278430 | 0.38927435 | 9.403570e-01 |
| log_lambda[63] | 2.752642e+00 | 0.002956137 | 0.25350833 | 2.221266e+00 |
| log_lambda[64] | 1.364341e+00 | 0.005262408 | 0.44575521 | 3.892911e-01 |
| log_lambda[65] | 1.679233e+00 | 0.004620183 | 0.38796479 | 8.497494e-01 |
| log_lambda[66] | 2.438590e+00 | 0.003052788 | 0.28383260 | 1.841427e+00 |
| log_lambda[67] | 1.485385e+00 | 0.005082748 | 0.42593923 | 5.834063e-01 |
| log_lambda[68] | 1.526390e+00 | 0.004702098 | 0.41468969 | 6.445255e-01 |
| log_lambda[69] | 2.812711e+00 | 0.002587090 | 0.24038800 | 2.320403e+00 |
| log_lambda[70] | 1.544795e+00 | 0.004470762 | 0.41094329 | 6.585813e-01 |
| log_lambda[71] | 1.866418e+00 | 0.003736589 | 0.35900861 | 1.107333e+00 |
| log_lambda[72] | 8.403182e-01 | 0.005778145 | 0.54565761 | -3.330471e-01 |
| log_lambda[73] | 2.093066e+00 | 0.003724797 | 0.32528958 | 1.401765e+00 |
| log_lambda[74] | 1.983048e+00 | 0.003991466 | 0.34350365 | 1.273575e+00 |
| log_lambda[75] | 1.672071e+00 | 0.004601700 | 0.39676414 | 8.371151e-01 |
| log_lambda[76] | 2.400224e+00 | 0.003161849 | 0.28473205 | 1.807672e+00 |
| log_lambda[77] | 2.534272e+00 | 0.003000786 | 0.26859501 | 1.971907e+00 |
| log_lambda[78] | 2.764118e+00 | 0.002588116 | 0.23446574 | 2.283551e+00 |
| log_lambda[79] | 1.460701e+00 | 0.005024654 | 0.42734109 | 5.437311e-01 |
| log_lambda[80] | 1.407116e+00 | 0.004756180 | 0.43808358 | 4.737222e-01 |
| log_lambda[81] | 1.714207e+00 | 0.004278280 | 0.39576237 | 8.857837e-01 |
| log_lambda[82] | 2.393339e+00 | 0.003153850 | 0.28148703 | 1.820283e+00 |
| log_lambda[83] | 2.216298e+00 | 0.003575218 | 0.31204505 | 1.563834e+00 |
| log_lambda[84] | 2.701232e+00 | 0.002611553 | 0.24489993 | 2.190506e+00 |

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log_lambda[85]   2.222729e+00 0.003490212 0.31195699  1.568803e+00
log_lambda[86]   2.724819e+00 0.002636555 0.24031869  2.232970e+00
log_lambda[87]   2.648134e+00 0.002752573 0.25927534  2.114374e+00
log_lambda[88]   2.838860e+00 0.002673202 0.23383287  2.350831e+00
log_lambda[89]   1.587457e+00 0.004753129 0.39246230  7.659076e-01
log_lambda[90]   2.407709e+00 0.003019841 0.29021882  1.820940e+00
log_lambda[91]   1.834684e+00 0.004200564 0.36742077  1.043660e+00
log_lambda[92]   2.003441e+00 0.003983366 0.35239197  1.292998e+00
log_lambda[93]   3.481607e+00 0.001783600 0.17187149  3.118724e+00
log_lambda[94]   2.633317e+00 0.002806566 0.25905949  2.092481e+00
log_lambda[95]   2.579937e+00 0.003063083 0.26692576  2.009678e+00
log_lambda[96]   2.832362e+00 0.002695246 0.23548728  2.349826e+00
log_lambda[97]   3.182338e+00 0.002040141 0.19160936  2.789407e+00
log_lambda[98]   2.593477e+00 0.002780763 0.25648665  2.075224e+00
log_lambda[99]   8.732015e-01 0.006080085 0.55244753 -3.062480e-01
log_lambda[100]  4.284353e+00 0.001204343 0.11930461  4.041654e+00
log_lambda[101]  2.502435e+00 0.002906339 0.27232478  1.954574e+00
log_lambda[102]  2.594317e+00 0.002809906 0.26328614  2.050104e+00
log_lambda[103]  1.687756e+00 0.004300814 0.38484951  9.022991e-01
log_lambda[104]  2.962604e+00 0.002315365 0.22244131  2.497975e+00
log_lambda[105]  2.025855e+00 0.003657425 0.34215007  1.281533e+00
log_lambda[106]  2.443684e+00 0.003209861 0.28317536  1.861179e+00
log_lambda[107]  2.205259e+00 0.003528886 0.31553302  1.566495e+00
log_lambda[108]  1.151433e+00 0.005374050 0.49282923  1.071066e-01
log_lambda[109]  2.356013e+00 0.003169586 0.29069859  1.753125e+00
log_lambda[110]  1.094726e+00 0.005655371 0.50457135  4.194414e-02
log_lambda[111]  2.339527e+00 0.003483225 0.28844971  1.740089e+00
log_lambda[112]  2.525127e+00 0.003334508 0.27611163  1.977045e+00
log_lambda[113]  2.362441e+00 0.003406523 0.29674866  1.743901e+00
log_lambda[114]  2.524164e+00 0.002924821 0.27493168  1.952902e+00
log_lambda[115]  2.242506e+00 0.003222662 0.30587667  1.597887e+00
log_lambda[116]  1.579125e+00 0.004893637 0.40715554  7.359577e-01
log_lambda[117]  2.857596e+00 0.002706680 0.23086703  2.362514e+00
log_lambda[118]  2.388631e+00 0.003445660 0.28394641  1.792885e+00
log_lambda[119]  3.103862e+00 0.002243711 0.20921398  2.692010e+00
log_lambda[120]  1.545054e+00 0.005107396 0.41430359  6.867499e-01
log_lambda[121]  2.141671e+00 0.003528323 0.31258184  1.492615e+00
log_lambda[122]  1.003613e+00 0.005911834 0.50726442 -7.013656e-02
log_lambda[123]  2.366728e+00 0.003411827 0.29575988  1.750648e+00
log_lambda[124]  2.206109e+00 0.003543133 0.31187886  1.561550e+00
log_lambda[125]  2.340785e+00 0.003354957 0.29873780  1.724038e+00
log_lambda[126]  1.774116e+00 0.004339244 0.38885287  9.551849e-01
log_lambda[127]  2.401899e+00 0.003358877 0.28406401  1.815971e+00
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log_lambda[128]  1.542831e+00 0.004896171 0.41656687  6.541137e-01
log_lambda[129]  2.933821e+00 0.002673391 0.22661629  2.483313e+00
log_lambda[130]  2.688190e+00 0.002807075 0.25757448  2.159039e+00
log_lambda[131]  1.302825e+00 0.005618241 0.45342674  3.086575e-01
log_lambda[132]  2.019866e+00 0.003941308 0.34767708  1.286127e+00
log_lambda[133]  2.144547e+00 0.003577312 0.33413066  1.465794e+00
log_lambda[134]  1.764662e+00 0.004389339 0.38436260  9.834622e-01
log_lambda[135]  1.361819e+00 0.005103371 0.44083645  4.433893e-01
log_lambda[136]  1.317610e+00 0.005100431 0.45707792  3.534499e-01
log_lambda[137]  9.088574e-01 0.006444514 0.52403633 -2.143592e-01
log_lambda[138]  2.418116e+00 0.003264248 0.28257084  1.834867e+00
log_lambda[139]  2.442661e+00 0.003209304 0.27875679  1.869489e+00
log_lambda[140]  2.337159e+00 0.003109500 0.28478274  1.761026e+00
log_lambda[141]  2.142608e+00 0.003449698 0.32850566  1.473631e+00
log_lambda[142]  1.839600e+00 0.004387770 0.37332987  1.055053e+00
log_lambda[143]  1.918231e+00 0.003953471 0.35021121  1.216307e+00
log_lambda[144]  2.028321e+00 0.003869695 0.34737543  1.302666e+00
log_lambda[145]  2.414054e+00 0.003097092 0.28556011  1.814710e+00
log_lambda[146]  2.358797e+00 0.003489826 0.29157165  1.738464e+00
log_lambda[147]  3.098481e+00 0.002325179 0.20734550  2.673555e+00
log_lambda[148]  1.924706e+00 0.004171210 0.35816326  1.166249e+00
log_lambda[149]  2.697051e+00 0.002745721 0.25674822  2.181184e+00
log_lambda[150]  3.833203e+00 0.001530091 0.14463037  3.544530e+00
log_lambda[151]  2.188301e+00 0.003668456 0.32276975  1.533406e+00
log_lambda[152]  2.868382e+00 0.002542452 0.23464528  2.378230e+00
log_lambda[153]  2.399982e+00 0.003203794 0.29107303  1.814075e+00
log_lambda[154]  2.500752e+00 0.003057846 0.26638326  1.945307e+00
log_lambda[155]  2.607073e+00 0.003128895 0.26058608  2.080052e+00
log_lambda[156]  2.619965e+00 0.002811869 0.26160151  2.077041e+00
log_lambda[157]  1.167951e+00 0.005672214 0.48783402  1.017595e-01
log_lambda[158]  2.209304e+00 0.003873722 0.32033116  1.541371e+00
log_lambda[159]  2.662414e+00 0.002877547 0.25439374  2.134046e+00
log_lambda[160]  1.744016e+00 0.004345535 0.38444510  9.390296e-01
log_lambda[161]  2.528177e+00 0.002864871 0.26702210  1.974160e+00
log_lambda[162]  2.534112e+00 0.002929204 0.27697201  1.954606e+00
log_lambda[163]  2.445622e+00 0.003361886 0.29513230  1.831373e+00
log_lambda[164]  2.022184e+00 0.003967072 0.33606407  1.339598e+00
log_lambda[165]  2.376263e+00 0.003051063 0.29121900  1.764841e+00
log_lambda[166]  1.598467e+00 0.004583344 0.41335239  7.291143e-01
log_lambda[167]  2.097249e+00 0.004059054 0.33118191  1.418490e+00
log_lambda[168]  2.051116e+00 0.003912545 0.33864166  1.342632e+00
log_lambda[169]  3.129269e+00 0.002275336 0.20742100  2.693072e+00
log_lambda[170]  2.146995e+00 0.003293400 0.31877815  1.458830e+00
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log_lambda[171]  8.780932e-01 0.006324066 0.53514096 -2.470651e-01
log_lambda[172]  2.238615e+00 0.003780112 0.31874184  1.569877e+00
log_lambda[173]  1.764404e+00 0.003680387 0.37119835  9.988546e-01
log_lambda[174]  2.270454e+00 0.003327256 0.30713808  1.618223e+00
log_lambda[175]  2.467767e+00 0.003316822 0.28257642  1.866314e+00
log_lambda[176]  2.164092e+00 0.003709897 0.32400712  1.467825e+00
log_lambda[177]  2.300933e+00 0.003215446 0.30016703  1.682932e+00
log_lambda[178]  3.465580e+00 0.001853835 0.17259343  3.115989e+00
log_lambda[179]  1.622245e+00 0.004870794 0.40001117  7.828649e-01
log_lambda[180]  2.358415e+00 0.003043406 0.28577651  1.762714e+00
log_lambda[181]  2.154750e+00 0.003796276 0.33234915  1.465630e+00
log_lambda[182]  2.368399e+00 0.003267064 0.28790310  1.796028e+00
log_lambda[183]  2.347063e+00 0.003201736 0.29143545  1.752577e+00
log_lambda[184]  2.432262e-01 0.008230304 0.65329886 -1.114366e+00
log_lambda[185]  2.156550e+00 0.003592422 0.32886795  1.477194e+00
log_lambda[186]  1.198378e+00 0.005477218 0.46896188  1.954351e-01
log_lambda[187]  2.395346e+00 0.003316551 0.28701450  1.814980e+00
log_lambda[188]  2.331256e+00 0.003153506 0.29828677  1.688590e+00
log_lambda[189]  2.331410e+00 0.003630154 0.30599960  1.701252e+00
log_lambda[190]  1.585830e+00 0.004811771 0.41189208  7.158053e-01
log_lambda[191]  1.356746e+00 0.004914455 0.42813363  4.391961e-01
log_lambda[192]  2.062436e+00 0.003536172 0.34795893  1.338810e+00
log_lambda[193]  2.137707e+00 0.003618069 0.32809383  1.446160e+00
log_lambda[194]  3.399485e+00 0.001911401 0.17996357  3.023441e+00
log_lambda[195]  4.702779e+00 0.001029687 0.09372857  4.515663e+00
log_lik[1]      -2.142302e+00 0.020421691 0.58950869 -3.681071e+00
log_lik[2]      -2.668741e+00 0.016307545 0.64943067 -4.501827e+00
log_lik[3]      -2.889045e+00 0.019337595 0.71759364 -4.939541e+00
log_lik[4]      -2.150731e+00 0.015499151 0.57496930 -3.787597e+00
log_lik[5]      -2.562601e+00 0.019293365 0.69131237 -4.504372e+00
log_lik[6]      -2.836951e+00 0.017220686 0.65073793 -4.729688e+00
log_lik[7]      -3.101918e+00 0.017746371 0.71031737 -5.083082e+00
log_lik[8]      -2.564775e+00 0.016658194 0.65936158 -4.411076e+00
log_lik[9]      -2.792821e+00 0.017619008 0.71762970 -4.895957e+00
log_lik[10]     -2.967286e+00 0.016599474 0.69569374 -4.913890e+00
log_lik[11]     -2.023134e+00 0.014403218 0.52967463 -3.531425e+00
log_lik[12]     -2.649993e+00 0.018191609 0.74831942 -4.770759e+00
log_lik[13]     -2.517133e+00 0.017116330 0.62871448 -4.310729e+00
log_lik[14]     -2.976714e+00 0.018316987 0.73700964 -5.029361e+00
log_lik[15]     -2.701586e+00 0.018129946 0.66052308 -4.550449e+00
log_lik[16]     -2.771247e+00 0.018591455 0.73913130 -4.861750e+00
log_lik[17]     -2.887384e+00 0.018020864 0.75874345 -4.985841e+00
log_lik[18]     -2.936725e+00 0.019525110 0.71464664 -4.983936e+00
```

| | | | | |
|---|---|---|---|---|
| log_lik[19] | -3.034135e+00 | 0.020876711 | 0.70577145 | -5.074621e+00 |
| log_lik[20] | -2.296551e+00 | 0.015473177 | 0.62454423 | -4.030890e+00 |
| log_lik[21] | -2.663616e+00 | 0.017033284 | 0.72114005 | -4.737813e+00 |
| log_lik[22] | -2.990695e+00 | 0.019840099 | 0.77103658 | -5.175456e+00 |
| log_lik[23] | -2.707341e+00 | 0.019851779 | 0.70328564 | -4.754769e+00 |
| log_lik[24] | -2.155108e+00 | 0.015484851 | 0.56913951 | -3.764274e+00 |
| log_lik[25] | -2.890801e+00 | 0.017871534 | 0.68772209 | -4.866693e+00 |
| log_lik[26] | -2.894861e+00 | 0.018897723 | 0.72709568 | -5.022042e+00 |
| log_lik[27] | -2.722065e+00 | 0.016359912 | 0.65854291 | -4.598062e+00 |
| log_lik[28] | -2.843011e+00 | 0.018159833 | 0.73512726 | -4.989292e+00 |
| log_lik[29] | -1.861289e+00 | 0.013054787 | 0.50726668 | -3.233307e+00 |
| log_lik[30] | -2.566875e+00 | 0.018033738 | 0.69417261 | -4.576516e+00 |
| log_lik[31] | -2.376922e+00 | 0.016128860 | 0.63462406 | -4.159513e+00 |
| log_lik[32] | -1.859433e+00 | 0.013178736 | 0.53160628 | -3.465227e+00 |
| log_lik[33] | -2.677479e+00 | 0.018360007 | 0.70655193 | -4.771251e+00 |
| log_lik[34] | -2.606271e+00 | 0.018166247 | 0.65857763 | -4.571740e+00 |
| log_lik[35] | -2.258893e+00 | 0.014232423 | 0.57921513 | -3.845493e+00 |
| log_lik[36] | -2.768851e+00 | 0.017844926 | 0.65198050 | -4.650632e+00 |
| log_lik[37] | -2.703457e+00 | 0.017832147 | 0.70275986 | -4.689318e+00 |
| log_lik[38] | -2.263516e+00 | 0.016612661 | 0.61132884 | -3.959871e+00 |
| log_lik[39] | -2.482484e+00 | 0.017046230 | 0.65757785 | -4.344941e+00 |
| log_lik[40] | -2.564394e+00 | 0.019780505 | 0.69110521 | -4.518764e+00 |
| log_lik[41] | -2.013303e+00 | 0.013156000 | 0.54164663 | -3.477272e+00 |
| log_lik[42] | -2.442304e+00 | 0.013856181 | 0.54248350 | -4.038086e+00 |
| log_lik[43] | -2.581078e+00 | 0.017431821 | 0.65093755 | -4.460832e+00 |
| log_lik[44] | -2.617205e+00 | 0.017338487 | 0.64960855 | -4.362383e+00 |
| log_lik[45] | -2.995904e+00 | 0.016261502 | 0.70738151 | -4.910917e+00 |
| log_lik[46] | -2.866545e+00 | 0.018794734 | 0.68940916 | -4.936270e+00 |
| log_lik[47] | -2.652081e+00 | 0.017331015 | 0.67673270 | -4.559783e+00 |
| log_lik[48] | -2.446864e+00 | 0.018530373 | 0.73829444 | -4.577151e+00 |
| log_lik[49] | -2.681752e+00 | 0.018160267 | 0.67883416 | -4.620979e+00 |
| log_lik[50] | -2.624479e+00 | 0.018105952 | 0.66598167 | -4.540827e+00 |
| log_lik[51] | -2.666015e+00 | 0.018465982 | 0.67832766 | -4.543154e+00 |
| log_lik[52] | -2.663276e+00 | 0.016042472 | 0.62758923 | -4.502241e+00 |
| log_lik[53] | -2.255139e+00 | 0.016895915 | 0.62233283 | -3.958648e+00 |
| log_lik[54] | -2.752491e+00 | 0.016517268 | 0.68883211 | -4.698794e+00 |
| log_lik[55] | -2.406901e+00 | 0.016511861 | 0.69419717 | -4.338109e+00 |
| log_lik[56] | -2.826582e+00 | 0.017833892 | 0.67045950 | -4.738351e+00 |
| log_lik[57] | -2.763737e+00 | 0.021570660 | 0.82957353 | -5.140165e+00 |
| log_lik[58] | -2.448625e+00 | 0.016402180 | 0.57991247 | -4.179650e+00 |
| log_lik[59] | -2.268082e+00 | 0.016611663 | 0.63381266 | -3.910956e+00 |
| log_lik[60] | -2.502191e+00 | 0.019073583 | 0.73984481 | -4.674431e+00 |
| log_lik[61] | -2.334828e+00 | 0.016527517 | 0.61949849 | -4.142338e+00 |

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log_lik[62]     -2.266478e+00 0.018589301 0.64017625 -3.992225e+00
log_lik[63]     -2.814880e+00 0.021002839 0.75525288 -4.966546e+00
log_lik[64]     -2.021474e+00 0.014344422 0.56109674 -3.583414e+00
log_lik[65]     -2.267328e+00 0.015078817 0.60325705 -3.969781e+00
log_lik[66]     -2.639656e+00 0.017818835 0.67962981 -4.517189e+00
log_lik[67]     -2.175663e+00 0.016857337 0.61531597 -3.910043e+00
log_lik[68]     -2.149423e+00 0.018066617 0.58942627 -3.791578e+00
log_lik[69]     -2.824353e+00 0.016770322 0.65706979 -4.630898e+00
log_lik[70]     -2.146904e+00 0.015900870 0.58895741 -3.897509e+00
log_lik[71]     -2.342480e+00 0.016564253 0.61146125 -4.074262e+00
log_lik[72]     -1.675829e+00 0.013163572 0.55857242 -3.284543e+00
log_lik[73]     -2.501578e+00 0.017443388 0.65401025 -4.405154e+00
log_lik[74]     -2.334617e+00 0.015035881 0.60717007 -4.009254e+00
log_lik[75]     -2.284466e+00 0.017436381 0.65366437 -4.111371e+00
log_lik[76]     -2.655192e+00 0.016823182 0.67274855 -4.526165e+00
log_lik[77]     -2.667205e+00 0.018637767 0.67755111 -4.677029e+00
log_lik[78]     -2.815228e+00 0.015576076 0.64190151 -4.593448e+00
log_lik[79]     -2.183462e+00 0.014389835 0.61789385 -4.026627e+00
log_lik[80]     -2.225004e+00 0.017165365 0.67956425 -4.113846e+00
log_lik[81]     -2.282922e+00 0.016624276 0.61824577 -4.044366e+00
log_lik[82]     -2.650407e+00 0.017304832 0.65489390 -4.490405e+00
log_lik[83]     -2.559789e+00 0.017488836 0.65904826 -4.469168e+00
log_lik[84]     -2.795338e+00 0.016012023 0.67173380 -4.722344e+00
log_lik[85]     -2.556487e+00 0.017588592 0.68836949 -4.467937e+00
log_lik[86]     -2.767864e+00 0.016155203 0.63642165 -4.639045e+00
log_lik[87]     -2.778743e+00 0.021486645 0.70027203 -4.717227e+00
log_lik[88]     -2.857478e+00 0.019730919 0.69016758 -4.849505e+00
log_lik[89]     -2.322313e+00 0.014918458 0.66010251 -4.201857e+00
log_lik[90]     -2.670324e+00 0.017630508 0.69619473 -4.591094e+00
log_lik[91]     -2.257591e+00 0.014600542 0.59768951 -4.009679e+00
log_lik[92]     -2.449714e+00 0.017613028 0.67224493 -4.328013e+00
log_lik[93]     -3.152309e+00 0.019002620 0.70176740 -5.269013e+00
log_lik[94]     -2.784353e+00 0.019559071 0.73914677 -4.902839e+00
log_lik[95]     -2.735876e+00 0.016554536 0.69425324 -4.721384e+00
log_lik[96]     -2.867254e+00 0.018789871 0.70184780 -4.829475e+00
log_lik[97]     -2.989472e+00 0.016240204 0.65620537 -4.974559e+00
log_lik[98]     -2.696896e+00 0.016078645 0.60891983 -4.434445e+00
log_lik[99]     -1.709309e+00 0.013468680 0.58944065 -3.359181e+00
log_lik[100]    -3.583052e+00 0.017470920 0.69778141 -5.584894e+00
log_lik[101]    -2.683552e+00 0.017332821 0.65875207 -4.552718e+00
log_lik[102]    -2.718575e+00 0.018551255 0.67532347 -4.666307e+00
log_lik[103]    -2.261416e+00 0.015051236 0.58082480 -3.842599e+00
log_lik[104]    -2.907551e+00 0.017163757 0.68243354 -4.906060e+00
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log_lik[105]    -2.422934e+00 0.018259702 0.66444978 -4.331579e+00
log_lik[106]    -2.639747e+00 0.016787387 0.65714270 -4.537634e+00
log_lik[107]    -2.575903e+00 0.017579397 0.68458644 -4.397586e+00
log_lik[108]    -1.886696e+00 0.015778814 0.58477538 -3.524633e+00
log_lik[109]    -2.576879e+00 0.015731293 0.65901299 -4.456022e+00
log_lik[110]    -1.878868e+00 0.013092907 0.52211329 -3.382986e+00
log_lik[111]    -2.575135e+00 0.015349206 0.59615145 -4.333651e+00
log_lik[112]    -2.693151e+00 0.016877875 0.63871614 -4.469499e+00
log_lik[113]    -2.597415e+00 0.018646685 0.68178114 -4.424473e+00
log_lik[114]    -2.688196e+00 0.018856486 0.67240221 -4.701118e+00
log_lik[115]    -2.534749e+00 0.017497636 0.66231546 -4.436436e+00
log_lik[116]    -2.146263e+00 0.015403059 0.56228306 -3.746615e+00
log_lik[117]    -2.838885e+00 0.016837427 0.67472485 -4.829719e+00
log_lik[118]    -2.552236e+00 0.015539943 0.66107910 -4.426183e+00
log_lik[119]    -2.990390e+00 0.018730938 0.66404326 -4.883864e+00
log_lik[120]    -2.151643e+00 0.014327451 0.56585865 -3.709516e+00
log_lik[121]    -2.455254e+00 0.016090426 0.59774157 -4.185243e+00
log_lik[122]    -1.763380e+00 0.011866276 0.62832329 -3.552506e+00
log_lik[123]    -2.594275e+00 0.018372271 0.66471579 -4.569527e+00
log_lik[124]    -2.468551e+00 0.017520111 0.63658953 -4.247746e+00
log_lik[125]    -2.606400e+00 0.018424736 0.66981151 -4.573425e+00
log_lik[126]    -2.272807e+00 0.015096434 0.60089242 -4.039572e+00
log_lik[127]    -2.569599e+00 0.015936636 0.62599447 -4.383508e+00
log_lik[128]    -2.155612e+00 0.013856286 0.55746635 -3.764812e+00
log_lik[129]    -2.878934e+00 0.016455283 0.64895048 -4.747721e+00
log_lik[130]    -2.768447e+00 0.018265266 0.68876812 -4.785279e+00
log_lik[131]    -2.022631e+00 0.014737043 0.57525071 -3.691461e+00
log_lik[132]    -2.434025e+00 0.018790922 0.65680931 -4.322369e+00
log_lik[133]    -2.514768e+00 0.018961891 0.68054854 -4.395915e+00
log_lik[134]    -2.261494e+00 0.015805997 0.58796181 -3.927201e+00
log_lik[135]    -2.011836e+00 0.013737999 0.52255775 -3.428785e+00
log_lik[136]    -2.035348e+00 0.014566944 0.55983178 -3.613008e+00
log_lik[137]    -1.698652e+00 0.012583265 0.56325901 -3.369636e+00
log_lik[138]    -2.641216e+00 0.016553897 0.66188018 -4.420717e+00
log_lik[139]    -2.623474e+00 0.016633817 0.63690181 -4.429242e+00
log_lik[140]    -2.564526e+00 0.014547797 0.59029517 -4.224639e+00
log_lik[141]    -2.496312e+00 0.017606430 0.64399367 -4.279843e+00
log_lik[142]    -2.378325e+00 0.020114709 0.66618894 -4.226867e+00
log_lik[143]    -2.325238e+00 0.014362103 0.58640049 -3.900044e+00
log_lik[144]    -2.435520e+00 0.018202846 0.65412989 -4.170488e+00
log_lik[145]    -2.649249e+00 0.018021846 0.69286631 -4.586956e+00
log_lik[146]    -2.580500e+00 0.015935885 0.62515568 -4.467498e+00
log_lik[147]    -2.981537e+00 0.021940399 0.73077359 -4.949275e+00
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log_lik[148]    -2.344227e+00 0.015705504 0.60416176 -4.087742e+00
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log_lik[150]    -3.316920e+00 0.017881969 0.70163647 -5.216320e+00
log_lik[151]    -2.489929e+00 0.016838039 0.63716537 -4.157929e+00
log_lik[152]    -2.857211e+00 0.020540018 0.71307673 -4.931490e+00
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log_lik[155]    -2.708684e+00 0.018209082 0.71318703 -4.719662e+00
log_lik[156]    -2.715186e+00 0.018079678 0.68107139 -4.751651e+00
log_lik[157]    -1.883482e+00 0.014149319 0.56536349 -3.481900e+00
log_lik[158]    -2.494638e+00 0.018249026 0.64665868 -4.252490e+00
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log_lik[160]    -2.257275e+00 0.016609387 0.61157951 -3.989155e+00
log_lik[161]    -2.661480e+00 0.016689855 0.64772805 -4.465575e+00
log_lik[162]    -2.693121e+00 0.020188250 0.73186649 -4.771647e+00
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log_lik[164]    -2.406971e+00 0.016487560 0.60702295 -4.015403e+00
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log_lik[167]    -2.513259e+00 0.016777619 0.68568091 -4.390107e+00
log_lik[168]    -2.414645e+00 0.017479117 0.62848494 -4.116614e+00
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log_lik[170]    -2.469397e+00 0.017711071 0.63271378 -4.394304e+00
log_lik[171]    -1.688318e+00 0.012932146 0.57585940 -3.257896e+00
log_lik[172]    -2.570982e+00 0.020318862 0.70666143 -4.587584e+00
log_lik[173]    -2.231204e+00 0.013676283 0.57154216 -3.883763e+00
log_lik[174]    -2.538929e+00 0.016297525 0.63722682 -4.369283e+00
log_lik[175]    -2.636789e+00 0.016144302 0.64289293 -4.502243e+00
log_lik[176]    -2.485201e+00 0.017386168 0.65522364 -4.403267e+00
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log_lik[181]    -2.508691e+00 0.019871835 0.67355305 -4.476490e+00
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log_lik[189]    -2.630071e+00 0.019283376 0.68990184 -4.565578e+00
log_lik[190]    -2.155067e+00 0.014246773 0.57040074 -3.726271e+00
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log_lik[191]    -1.989621e+00 0.013342835 0.50758627 -3.435042e+00
log_lik[192]    -2.445541e+00 0.020891802 0.71125157 -4.430602e+00
log_lik[193]    -2.494443e+00 0.018084201 0.68643389 -4.470744e+00
log_lik[194]    -3.105680e+00 0.018421734 0.69718946 -5.076795e+00
log_lik[195]    -3.753718e+00 0.015970234 0.66814427 -5.606232e+00
lp__             3.898844e+03 0.268699841 9.81312266  3.878981e+03
                          25%           50%           75%         97.5%
alpha[1]        -5.931081e-01 -3.117612e-01 -5.429743e-02  3.987191e-01
alpha[2]         1.011946e-01  2.927873e-01  4.680765e-01  7.777050e-01
alpha[3]         3.300636e-01  5.216327e-01  7.000551e-01  1.028900e+00
alpha[4]        -5.975029e-01 -3.012647e-01 -3.802722e-02  4.135424e-01
alpha[5]         3.207971e-01  5.402241e-01  7.602674e-01  1.101093e+00
alpha[6]        -8.814688e-01 -7.161980e-01 -5.552381e-01 -2.567442e-01
alpha[7]         3.443322e-01  5.096017e-01  6.698205e-01  9.587812e-01
alpha[8]        -7.889895e-01 -5.631754e-01 -3.325513e-01  5.887417e-02
alpha[9]         5.669714e-01  7.438997e-01  9.159514e-01  1.217341e+00
alpha[10]        6.426384e-01  7.848243e-01  9.254782e-01  1.175844e+00
alpha[11]       -4.315146e-01 -1.179090e-01  1.915183e-01  6.891579e-01
alpha[12]        6.146023e-01  8.278405e-01  1.033982e+00  1.410366e+00
alpha[13]       -1.842408e-01  1.762042e-02  2.150729e-01  5.732009e-01
alpha[14]        5.151405e-01  6.591373e-01  8.018395e-01  1.072516e+00
alpha[15]        1.583742e-01  3.520324e-01  5.383539e-01  8.571628e-01
alpha[16]        7.290247e-01  9.129570e-01  1.087862e+00  1.407430e+00
alpha[17]        8.509710e-01  1.027409e+00  1.193758e+00  1.484962e+00
alpha[18]        4.594242e-01  6.102345e-01  7.471746e-01  1.002662e+00
alpha[19]       -9.392860e-02  6.098133e-02  2.208821e-01  5.144718e-01
alpha[20]        1.960107e-01  4.780527e-01  7.376463e-01  1.172390e+00
alpha[21]        6.406702e-01  8.662640e-01  1.074437e+00  1.457487e+00
alpha[22]        9.159075e-01  1.078295e+00  1.231294e+00  1.531486e+00
alpha[23]        2.600541e-01  4.558382e-01  6.445386e-01  9.657536e-01
alpha[24]       -4.023117e-01 -1.073776e-01  1.495527e-01  6.198299e-01
alpha[25]        1.350806e-01  3.179030e-01  4.825439e-01  7.975518e-01
alpha[26]        6.947563e-01  8.549093e-01  1.008024e+00  1.291847e+00
alpha[27]        5.022872e-01  6.843298e-01  8.538549e-01  1.153050e+00
alpha[28]        6.652298e-01  8.360500e-01  9.929891e-01  1.305213e+00
alpha[29]       -3.975383e-01 -5.224028e-02  2.792877e-01  8.460632e-01
alpha[30]        3.676520e-01  6.004389e-01  8.321560e-01  1.220710e+00
alpha[31]       -6.532601e-02  2.065257e-01  4.572507e-01  8.426881e-01
alpha[32]       -8.281143e-01 -4.941420e-01 -1.894730e-01  3.546806e-01
alpha[33]        5.165545e-01  7.155957e-01  9.007544e-01  1.234636e+00
alpha[34]        1.937076e-01  4.006614e-01  5.919957e-01  9.376721e-01
alpha[35]       -3.341291e-01 -6.268877e-02  1.852297e-01  6.284105e-01
alpha[36]       -6.282858e-01 -4.418659e-01 -2.505820e-01  8.752475e-02
```

| | | | | |
|---|---|---|---|---|
| alpha[37] | 4.165396e-01 | 6.050619e-01 | 7.881299e-01 | 1.103362e+00 |
| alpha[38] | -3.820992e-01 | -1.161408e-01 | 1.357749e-01 | 5.772541e-01 |
| alpha[39] | -3.827969e-01 | -1.588642e-01 | 5.168871e-02 | 4.164560e-01 |
| alpha[40] | 2.389543e-01 | 4.492339e-01 | 6.646104e-01 | 1.053966e+00 |
| alpha[41] | -7.202489e-01 | -4.201388e-01 | -1.402962e-01 | 3.205862e-01 |
| alpha[42] | -4.370724e-01 | -2.178778e-01 | -4.706064e-03 | 3.212936e-01 |
| alpha[43] | -8.617261e-02 | 1.134675e-01 | 3.032210e-01 | 6.429874e-01 |
| alpha[44] | -3.512334e-01 | -1.541797e-01 | 2.622112e-02 | 3.467882e-01 |
| alpha[45] | 7.276426e-01 | 8.712664e-01 | 1.010415e+00 | 1.248523e+00 |
| alpha[46] | -3.474084e-01 | -1.763206e-01 | -4.944338e-03 | 2.998239e-01 |
| alpha[47] | 2.306959e-01 | 4.291619e-01 | 6.154933e-01 | 9.533872e-01 |
| alpha[48] | 4.898723e-01 | 7.453713e-01 | 1.003621e+00 | 1.425455e+00 |
| alpha[49] | -1.954947e-02 | 1.674446e-01 | 3.404079e-01 | 6.745483e-01 |
| alpha[50] | -1.507193e-01 | 2.654654e-02 | 2.143369e-01 | 5.388855e-01 |
| alpha[51] | -5.596002e-01 | -3.480240e-01 | -1.431660e-01 | 2.157630e-01 |
| alpha[52] | -1.166986e-01 | 6.945896e-02 | 2.544838e-01 | 5.926703e-01 |
| alpha[53] | -7.254973e-01 | -4.622775e-01 | -2.245801e-01 | 1.930368e-01 |
| alpha[54] | 8.278868e-01 | 1.015583e+00 | 1.192622e+00 | 1.488982e+00 |
| alpha[55] | 2.700999e-01 | 5.231809e-01 | 7.711936e-01 | 1.206503e+00 |
| alpha[56] | -2.264049e-01 | -6.679456e-02 | 7.955709e-02 | 3.545674e-01 |
| alpha[57] | 7.052147e-01 | 8.919885e-01 | 1.074039e+00 | 1.411264e+00 |
| alpha[58] | -7.176056e-01 | -4.937200e-01 | -2.793868e-01 | 9.428654e-02 |
| alpha[59] | -5.212396e-01 | -2.499675e-01 | 7.507961e-03 | 4.224794e-01 |
| alpha[60] | 2.884099e-01 | 5.480878e-01 | 7.876990e-01 | 1.187447e+00 |
| alpha[61] | -3.043233e-01 | -5.382016e-02 | 1.603998e-01 | 5.786812e-01 |
| alpha[62] | -3.528233e-01 | -8.330967e-02 | 1.741397e-01 | 6.072956e-01 |
| alpha[63] | -3.178041e-01 | -1.436927e-01 | 1.679396e-02 | 3.162046e-01 |
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| alpha[68] | -3.031331e-01 | -6.665442e-04 | 2.511263e-01 | 7.072121e-01 |
| alpha[69] | -3.554124e-01 | -1.786650e-01 | -9.730103e-03 | 2.920217e-01 |
| alpha[70] | -3.057102e-01 | -2.837030e-02 | 2.307105e-01 | 7.314479e-01 |
| alpha[71] | -1.018629e-01 | 1.591738e-01 | 3.936641e-01 | 8.179331e-01 |
| alpha[72] | -9.887348e-01 | -6.290501e-01 | -2.850810e-01 | 3.171820e-01 |
| alpha[73] | 2.294184e-01 | 4.537938e-01 | 6.698242e-01 | 1.044120e+00 |
| alpha[74] | -9.008444e-01 | -6.611498e-01 | -4.285688e-01 | -4.845281e-02 |
| alpha[75] | 2.382689e-02 | 3.018808e-01 | 5.468347e-01 | 9.817269e-01 |
| alpha[76] | 3.842468e-01 | 5.907030e-01 | 7.726457e-01 | 1.106383e+00 |
| alpha[77] | -2.527090e-01 | -7.672506e-02 | 1.018548e-01 | 4.124501e-01 |
| alpha[78] | 4.737202e-01 | 6.367195e-01 | 7.889892e-01 | 1.068171e+00 |
| alpha[79] | 4.203243e-02 | 3.397576e-01 | 6.174302e-01 | 1.067188e+00 |

| | | | | |
|---|---|---|---|---|
| alpha[80] | 2.548185e-01 | 5.591500e-01 | 8.384187e-01 | 1.313265e+00 |
| alpha[81] | -2.532185e-01 | 2.946304e-02 | 2.974610e-01 | 7.340513e-01 |
| alpha[82] | 4.560810e-01 | 6.560917e-01 | 8.469086e-01 | 1.160976e+00 |
| alpha[83] | 1.454373e-01 | 3.580318e-01 | 5.628626e-01 | 9.203787e-01 |
| alpha[84] | 4.441187e-01 | 6.233595e-01 | 7.973366e-01 | 1.114069e+00 |
| alpha[85] | 1.101975e-01 | 3.227983e-01 | 5.239319e-01 | 8.860317e-01 |
| alpha[86] | 1.779298e-01 | 3.412008e-01 | 5.003897e-01 | 7.982986e-01 |
| alpha[87] | 2.164940e-01 | 3.977540e-01 | 5.681004e-01 | 8.722157e-01 |
| alpha[88] | 3.678732e-01 | 5.343723e-01 | 6.809005e-01 | 9.651707e-01 |
| alpha[89] | 4.635982e-01 | 7.357542e-01 | 1.002903e+00 | 1.435882e+00 |
| alpha[90] | 2.841688e-01 | 4.889981e-01 | 6.813707e-01 | 1.003347e+00 |
| alpha[91] | -9.335577e-01 | -6.759414e-01 | -4.209629e-01 | -8.505474e-03 |
| alpha[92] | -1.300722e-01 | 1.228532e-01 | 3.501955e-01 | 7.483581e-01 |
| alpha[93] | -5.699038e-02 | 7.068249e-02 | 2.033482e-01 | 4.367862e-01 |
| alpha[94] | 4.481230e-01 | 6.253383e-01 | 7.907971e-01 | 1.091547e+00 |
| alpha[95] | 1.692598e-01 | 3.490119e-01 | 5.192117e-01 | 8.355821e-01 |
| alpha[96] | 3.105324e-01 | 4.825711e-01 | 6.356531e-01 | 9.021524e-01 |
| alpha[97] | 2.954570e-01 | 4.328981e-01 | 5.667646e-01 | 8.077623e-01 |
| alpha[98] | 4.027995e-03 | 1.831216e-01 | 3.629410e-01 | 6.462319e-01 |
| alpha[99] | -1.114318e+00 | -7.300257e-01 | -3.769077e-01 | 2.182268e-01 |
| alpha[100] | -1.547834e-01 | -5.595775e-02 | 4.311657e-02 | 2.311253e-01 |
| alpha[101] | 2.270159e-01 | 4.196632e-01 | 5.994272e-01 | 8.952067e-01 |
| alpha[102] | -2.127546e-03 | 1.824440e-01 | 3.548017e-01 | 6.475423e-01 |
| alpha[103] | -6.692104e-02 | 1.952091e-01 | 4.624448e-01 | 8.811629e-01 |
| alpha[104] | -1.255466e-03 | 1.572813e-01 | 3.113631e-01 | 5.792422e-01 |
| alpha[105] | -2.421566e-01 | -1.319126e-02 | 2.007111e-01 | 6.107595e-01 |
| alpha[106] | -1.803276e-01 | 1.581889e-02 | 2.095712e-01 | 5.327967e-01 |
| alpha[107] | 2.878551e-01 | 5.088179e-01 | 7.165684e-01 | 1.088020e+00 |
| alpha[108] | -8.340230e-01 | -4.960995e-01 | -1.879850e-01 | 3.656103e-01 |
| alpha[109] | -1.746511e-01 | 2.538947e-02 | 2.224461e-01 | 5.264039e-01 |
| alpha[110] | -7.041951e-01 | -3.436075e-01 | -9.214152e-03 | 5.437664e-01 |
| alpha[111] | -6.590617e-02 | 1.421237e-01 | 3.352429e-01 | 6.697149e-01 |
| alpha[112] | -1.463715e-01 | 6.117551e-02 | 2.438515e-01 | 5.542779e-01 |
| alpha[113] | -2.650569e-01 | -5.419177e-02 | 1.404659e-01 | 4.812417e-01 |
| alpha[114] | -1.390412e-01 | 6.247793e-02 | 2.436885e-01 | 5.859414e-01 |
| alpha[115] | -8.416382e-02 | 1.210636e-01 | 3.244752e-01 | 6.790090e-01 |
| alpha[116] | -5.247828e-01 | -2.438793e-01 | 2.851041e-02 | 4.768518e-01 |
| alpha[117] | 1.236558e-03 | 1.743705e-01 | 3.208288e-01 | 5.909747e-01 |
| alpha[118] | -1.503888e+00 | -1.300407e+00 | -1.107900e+00 | -7.742913e-01 |
| alpha[119] | 4.275650e-02 | 1.964428e-01 | 3.449188e-01 | 6.034121e-01 |
| alpha[120] | -3.505851e-01 | -6.320137e-02 | 2.151688e-01 | 6.544631e-01 |
| alpha[121] | -9.168588e-02 | 1.263668e-01 | 3.311659e-01 | 6.990703e-01 |
| alpha[122] | -1.391890e+00 | -1.029863e+00 | -6.888413e-01 | -1.713430e-01 |

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| alpha[123] | -3.085800e-01 | -1.050773e-01 | 8.762363e-02 | 4.342679e-01 |
| alpha[124] | -6.832827e-01 | -4.654065e-01 | -2.582998e-01 | 1.037208e-01 |
| alpha[125] | -3.029950e-02 | 1.791250e-01 | 3.693854e-01 | 7.085328e-01 |
| alpha[126] | -5.674093e-01 | -2.991613e-01 | -3.783604e-02 | 3.856677e-01 |
| alpha[127] | -6.215474e-01 | -4.197161e-01 | -2.345650e-01 | 1.074556e-01 |
| alpha[128] | -3.183942e-01 | -3.778944e-02 | 2.391249e-01 | 7.001924e-01 |
| alpha[129] | -4.344434e-01 | -2.722801e-01 | -1.167339e-01 | 1.361347e-01 |
| alpha[130] | -3.768976e-01 | -2.009685e-01 | -2.791458e-02 | 2.663161e-01 |
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| alpha[133] | -2.513418e-01 | -1.322345e-03 | 2.137121e-01 | 5.737138e-01 |
| alpha[134] | -4.687205e-01 | -2.013839e-01 | 5.426178e-02 | 4.818327e-01 |
| alpha[135] | -5.848392e-01 | -2.724152e-01 | 1.507414e-02 | 4.745929e-01 |
| alpha[136] | -4.289472e-01 | -1.057866e-01 | 1.873455e-01 | 7.021139e-01 |
| alpha[137] | -1.167054e+00 | -8.060706e-01 | -4.618909e-01 | 1.050613e-01 |
| alpha[138] | 1.636734e-01 | 3.570685e-01 | 5.364489e-01 | 8.793360e-01 |
| alpha[139] | -1.589509e-01 | 4.248014e-02 | 2.199372e-01 | 5.449796e-01 |
| alpha[140] | 5.326157e-02 | 2.531002e-01 | 4.451073e-01 | 7.688764e-01 |
| alpha[141] | -1.455017e-01 | 9.700639e-02 | 3.128449e-01 | 6.775898e-01 |
| alpha[142] | 2.508740e-02 | 2.786180e-01 | 5.211411e-01 | 9.554737e-01 |
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| alpha[145] | 1.872749e-01 | 3.816889e-01 | 5.784560e-01 | 9.099025e-01 |
| alpha[146] | -2.430636e-01 | -3.736559e-02 | 1.525066e-01 | 4.893123e-01 |
| alpha[147] | 2.002189e-01 | 3.420311e-01 | 4.768375e-01 | 7.279301e-01 |
| alpha[148] | -5.244281e-01 | -2.639636e-01 | -2.905374e-02 | 3.769431e-01 |
| alpha[149] | 5.916753e-01 | 7.742911e-01 | 9.358476e-01 | 1.248369e+00 |
| alpha[150] | -6.879271e-01 | -5.872450e-01 | -4.862255e-01 | -3.098776e-01 |
| alpha[151] | -5.559559e-01 | -3.230682e-01 | -1.023172e-01 | 2.380628e-01 |
| alpha[152] | -2.251279e-01 | -6.172995e-02 | 1.063366e-01 | 3.812417e-01 |
| alpha[153] | 3.255958e-01 | 5.334917e-01 | 7.210143e-01 | 1.062498e+00 |
| alpha[154] | 2.282968e-01 | 4.136049e-01 | 5.894123e-01 | 8.937988e-01 |
| alpha[155] | -1.769803e-01 | 6.338800e-03 | 1.701416e-01 | 4.893326e-01 |
| alpha[156] | -3.923851e-01 | -2.218298e-01 | -5.023729e-02 | 2.597767e-01 |
| alpha[157] | -9.055710e-01 | -5.652428e-01 | -2.614903e-01 | 2.684368e-01 |
| alpha[158] | -7.631772e-01 | -5.327528e-01 | -3.213625e-01 | 5.282656e-02 |
| alpha[159] | 5.634846e-02 | 2.228726e-01 | 3.982184e-01 | 6.990725e-01 |
| alpha[160] | -4.451374e-01 | -1.827567e-01 | 6.068269e-02 | 5.081494e-01 |
| alpha[161] | -1.713958e-01 | 1.269047e-02 | 1.904033e-01 | 5.109050e-01 |
| alpha[162] | -2.681647e-01 | -7.618007e-02 | 1.037597e-01 | 4.177143e-01 |
| alpha[163] | -1.402613e-01 | 6.097802e-02 | 2.535993e-01 | 5.832052e-01 |
| alpha[164] | -2.027050e-01 | 3.350289e-02 | 2.569379e-01 | 6.183475e-01 |
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alpha[166]      -6.243709e-01 -3.301072e-01 -6.291976e-02  4.030403e-01
alpha[167]       1.564455e-01  3.863118e-01  5.991613e-01  9.695569e-01
alpha[168]      -4.100729e-01 -1.836241e-01  4.592733e-02  4.129490e-01
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alpha[190]      -6.138036e-01 -3.165518e-01 -4.355761e-02  4.308785e-01
alpha[191]      -5.261693e-01 -2.248866e-01  4.702860e-02  5.366128e-01
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alpha[193]      -1.079180e-01  1.202938e-01  3.388401e-01  7.018537e-01
alpha[194]      -5.232385e-01 -4.024037e-01 -2.844042e-01 -6.186439e-02
alpha[195]      -8.190884e-01 -7.260827e-01 -6.419700e-01 -4.785667e-01
beta             1.055622e+00  1.469551e+00  1.863309e+00  2.651140e+00
log_theta[1]    -4.810050e-01 -2.024415e-01  5.429628e-02  4.979474e-01
log_theta[2]     1.944186e-01  3.887261e-01  5.599086e-01  8.669126e-01
log_theta[3]     6.937531e-01  8.599879e-01  1.022896e+00  1.302328e+00
log_theta[4]    -3.908447e-01 -1.103284e-01  1.522612e-01  6.008261e-01
log_theta[5]     5.647421e-01  7.777314e-01  9.843995e-01  1.333039e+00
log_theta[6]    -6.274198e-01 -4.679947e-01 -3.175646e-01 -6.041559e-02
log_theta[7]     7.449226e-01  8.753697e-01  9.969080e-01  1.212233e+00
log_theta[8]    -4.068176e-01 -1.863092e-01  2.087878e-02  3.660476e-01
log_theta[9]     4.731838e-01  6.503935e-01  8.166776e-01  1.116614e+00
log_theta[10]    6.554626e-01  7.969476e-01  9.382175e-01  1.188617e+00
log_theta[11]   -3.016743e-01  1.536154e-02  3.197325e-01  8.034863e-01
log_theta[12]    8.561484e-01  1.067792e+00  1.255954e+00  1.612646e+00
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| log_theta[13] | -9.147117e-02 | 1.077369e-01 | 3.058030e-01 | 6.532754e-01 |
| log_theta[14] | 6.434038e-01 | 7.848647e-01 | 9.228874e-01 | 1.180171e+00 |
| log_theta[15] | 2.161352e-01 | 4.071777e-01 | 5.927864e-01 | 9.141767e-01 |
| log_theta[16] | 8.964676e-01 | 1.075172e+00 | 1.247722e+00 | 1.565504e+00 |
| log_theta[17] | 9.836153e-01 | 1.152926e+00 | 1.314241e+00 | 1.600340e+00 |
| log_theta[18] | 4.854086e-01 | 6.375972e-01 | 7.737548e-01 | 1.029655e+00 |
| log_theta[19] | 2.311126e-01 | 3.661360e-01 | 5.056016e-01 | 7.488142e-01 |
| log_theta[20] | 3.050449e-01 | 5.854652e-01 | 8.429610e-01 | 1.276228e+00 |
| log_theta[21] | 9.442696e-01 | 1.161986e+00 | 1.364017e+00 | 1.720318e+00 |
| log_theta[22] | 1.120212e+00 | 1.274894e+00 | 1.416744e+00 | 1.689348e+00 |
| log_theta[23] | 4.504759e-01 | 6.356673e-01 | 8.194676e-01 | 1.122440e+00 |
| log_theta[24] | -2.875047e-01 | 6.268438e-03 | 2.633835e-01 | 7.233592e-01 |
| log_theta[25] | 4.663695e-01 | 6.252943e-01 | 7.732481e-01 | 1.040463e+00 |
| log_theta[26] | 7.234069e-01 | 8.861464e-01 | 1.037471e+00 | 1.321490e+00 |
| log_theta[27] | 6.417570e-01 | 8.263474e-01 | 9.956255e-01 | 1.282555e+00 |
| log_theta[28] | 8.616656e-01 | 1.023963e+00 | 1.180569e+00 | 1.471089e+00 |
| log_theta[29] | -1.204791e-01 | 2.284789e-01 | 5.475769e-01 | 1.105416e+00 |
| log_theta[30] | 7.630624e-01 | 9.710305e-01 | 1.174172e+00 | 1.536881e+00 |
| log_theta[31] | 1.222655e-01 | 3.878746e-01 | 6.331582e-01 | 1.010528e+00 |
| log_theta[32] | -5.642479e-01 | -2.388004e-01 | 7.306135e-02 | 6.185481e-01 |
| log_theta[33] | 4.513952e-01 | 6.409625e-01 | 8.246555e-01 | 1.158235e+00 |
| log_theta[34] | 2.710706e-01 | 4.764159e-01 | 6.687962e-01 | 1.019528e+00 |
| log_theta[35] | -1.472815e-01 | 1.212411e-01 | 3.661220e-01 | 7.927120e-01 |
| log_theta[36] | -2.160610e-01 | -4.850631e-02 | 1.047950e-01 | 3.828751e-01 |
| log_theta[37] | 4.834242e-01 | 6.681127e-01 | 8.546620e-01 | 1.162282e+00 |
| log_theta[38] | -2.297494e-01 | 3.637124e-02 | 2.837458e-01 | 7.328601e-01 |
| log_theta[39] | -5.018558e-01 | -2.748559e-01 | -6.492259e-02 | 2.913643e-01 |
| log_theta[40] | 4.686015e-01 | 6.758288e-01 | 8.825661e-01 | 1.247940e+00 |
| log_theta[41] | -6.961392e-01 | -3.937695e-01 | -1.158813e-01 | 3.417390e-01 |
| log_theta[42] | -4.171292e-01 | -1.958023e-01 | 1.296701e-02 | 3.416559e-01 |
| log_theta[43] | 3.871913e-02 | 2.319050e-01 | 4.209096e-01 | 7.607324e-01 |
| log_theta[44] | -2.970107e-01 | -1.052471e-01 | 7.558508e-02 | 3.969315e-01 |
| log_theta[45] | 7.125869e-01 | 8.555857e-01 | 9.946312e-01 | 1.232106e+00 |
| log_theta[46] | -1.209631e-01 | 4.286506e-02 | 2.005124e-01 | 4.784892e-01 |
| log_theta[47] | 1.004709e-01 | 2.926475e-01 | 4.813690e-01 | 8.098148e-01 |
| log_theta[48] | 4.658426e-01 | 7.203832e-01 | 9.764540e-01 | 1.402850e+00 |
| log_theta[49] | 7.001981e-02 | 2.579263e-01 | 4.256680e-01 | 7.629873e-01 |
| log_theta[50] | -2.214752e-01 | -4.274847e-02 | 1.429773e-01 | 4.639066e-01 |
| log_theta[51] | -2.829498e-01 | -8.070594e-02 | 1.109775e-01 | 4.459688e-01 |
| log_theta[52] | 7.182635e-02 | 2.545077e-01 | 4.351451e-01 | 7.392912e-01 |
| log_theta[53] | -7.744719e-01 | -5.111007e-01 | -2.730000e-01 | 1.454613e-01 |
| log_theta[54] | 7.300008e-01 | 9.169729e-01 | 1.092234e+00 | 1.381916e+00 |
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| log_theta[56] | -1.177881e-01 | 3.795253e-02 | 1.824074e-01 | 4.510426e-01 |
| log_theta[57] | 5.864996e-01 | 7.748263e-01 | 9.583196e-01 | 1.285319e+00 |
| log_theta[58] | -4.267128e-01 | -2.142553e-01 | -1.230097e-02 | 3.376224e-01 |
| log_theta[59] | -6.128196e-01 | -3.443889e-01 | -9.020662e-02 | 3.325349e-01 |
| log_theta[60] | 1.049937e-01 | 3.556284e-01 | 5.944552e-01 | 9.884652e-01 |
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| log_theta[64] | -6.602586e-01 | -3.690391e-01 | -8.660691e-02 | 4.176483e-01 |
| log_theta[65] | -1.570543e-01 | 1.269834e-01 | 3.773909e-01 | 8.246782e-01 |
| log_theta[66] | -2.264194e-01 | -3.011357e-02 | 1.431905e-01 | 4.722609e-01 |
| log_theta[67] | -2.911123e-01 | 3.670471e-03 | 2.818473e-01 | 7.458620e-01 |
| log_theta[68] | -2.213590e-01 | 7.938259e-02 | 3.307719e-01 | 7.812507e-01 |
| log_theta[69] | -1.419056e-01 | 2.927512e-02 | 1.833170e-01 | 4.665053e-01 |
| log_theta[70] | -5.094894e-01 | -2.219285e-01 | 3.136474e-02 | 5.103875e-01 |
| log_theta[71] | -2.271177e-01 | 2.441416e-02 | 2.561967e-01 | 6.737454e-01 |
| log_theta[72] | -1.156486e+00 | -7.876518e-01 | -4.443550e-01 | 1.581927e-01 |
| log_theta[73] | 3.606620e-01 | 5.810513e-01 | 7.942407e-01 | 1.165351e+00 |
| log_theta[74] | -7.133396e-01 | -4.737641e-01 | -2.478721e-01 | 1.270782e-01 |
| log_theta[75] | 2.563017e-02 | 3.034813e-01 | 5.489580e-01 | 9.843814e-01 |
| log_theta[76] | 5.137611e-01 | 7.143841e-01 | 8.892662e-01 | 1.227374e+00 |
| log_theta[77] | -2.094088e-01 | -3.244880e-02 | 1.440247e-01 | 4.588179e-01 |
| log_theta[78] | 4.430737e-01 | 6.056655e-01 | 7.614386e-01 | 1.035625e+00 |
| log_theta[79] | 1.366781e-01 | 4.316260e-01 | 7.129587e-01 | 1.153817e+00 |
| log_theta[80] | 3.788388e-01 | 6.735732e-01 | 9.585287e-01 | 1.432637e+00 |
| log_theta[81] | -4.421441e-02 | 2.325618e-01 | 4.912695e-01 | 9.365235e-01 |
| log_theta[82] | 4.363413e-01 | 6.359562e-01 | 8.266347e-01 | 1.144403e+00 |
| log_theta[83] | 1.201880e-01 | 3.320413e-01 | 5.368613e-01 | 8.878913e-01 |
| log_theta[84] | 7.285033e-01 | 9.022121e-01 | 1.059636e+00 | 1.339287e+00 |
| log_theta[85] | 2.700781e-01 | 4.834623e-01 | 6.825461e-01 | 1.035670e+00 |
| log_theta[86] | 5.891088e-02 | 2.197757e-01 | 3.768954e-01 | 6.693170e-01 |
| log_theta[87] | 1.191734e-01 | 3.029689e-01 | 4.726436e-01 | 7.727196e-01 |
| log_theta[88] | 3.615803e-01 | 5.285971e-01 | 6.745286e-01 | 9.592210e-01 |
| log_theta[89] | 4.052415e-01 | 6.798290e-01 | 9.464608e-01 | 1.386681e+00 |
| log_theta[90] | 3.897751e-01 | 5.873840e-01 | 7.839289e-01 | 1.115042e+00 |
| log_theta[91] | -1.069248e+00 | -8.118312e-01 | -5.647181e-01 | -1.488325e-01 |
| log_theta[92] | 3.126114e-02 | 2.855074e-01 | 5.050868e-01 | 8.893575e-01 |
| log_theta[93] | -2.611682e-01 | -1.494657e-01 | -3.866597e-02 | 1.779698e-01 |
| log_theta[94] | 4.101793e-01 | 5.876240e-01 | 7.559201e-01 | 1.052365e+00 |
| log_theta[95] | 1.261093e-01 | 3.049213e-01 | 4.713180e-01 | 7.856654e-01 |
| log_theta[96] | 2.240797e-01 | 3.922247e-01 | 5.459822e-01 | 8.014286e-01 |
| log_theta[97] | 1.360241e-01 | 2.686199e-01 | 3.947013e-01 | 6.248513e-01 |
| log_theta[98] | -9.091821e-02 | 9.552534e-02 | 2.705617e-01 | 5.507339e-01 |

| | | | | |
|---|---|---|---|---|
| log_theta[99] | -1.164246e+00 | -7.825997e-01 | -4.187597e-01 | 1.560918e-01 |
| log_theta[100] | 7.711567e-02 | 1.604898e-01 | 2.397848e-01 | 3.872983e-01 |
| log_theta[101] | 1.762454e-01 | 3.684253e-01 | 5.491368e-01 | 8.465859e-01 |
| log_theta[102] | -6.601753e-02 | 1.192019e-01 | 2.872236e-01 | 5.783965e-01 |
| log_theta[103] | -1.677555e-02 | 2.419864e-01 | 5.073588e-01 | 9.244534e-01 |
| log_theta[104] | -1.475551e-01 | 5.923364e-03 | 1.511777e-01 | 4.099660e-01 |
| log_theta[105] | -2.957383e-01 | -6.391455e-02 | 1.506145e-01 | 5.568719e-01 |
| log_theta[106] | -3.015989e-01 | -1.056700e-01 | 8.502511e-02 | 4.021884e-01 |
| log_theta[107] | 4.405705e-01 | 6.582255e-01 | 8.662153e-01 | 1.214104e+00 |
| log_theta[108] | -8.735839e-01 | -5.352162e-01 | -2.282559e-01 | 3.267807e-01 |
| log_theta[109] | -2.340273e-01 | -3.648189e-02 | 1.577218e-01 | 4.634866e-01 |
| log_theta[110] | -7.963763e-01 | -4.365701e-01 | -1.053281e-01 | 4.387818e-01 |
| log_theta[111] | -2.045261e-01 | -9.074570e-04 | 1.951675e-01 | 5.105341e-01 |
| log_theta[112] | -2.402314e-01 | -3.498510e-02 | 1.487995e-01 | 4.565659e-01 |
| log_theta[113] | -3.859496e-01 | -1.893770e-01 | 1.169242e-02 | 3.416877e-01 |
| log_theta[114] | -3.319640e-01 | -1.468556e-01 | 3.037533e-02 | 3.457523e-01 |
| log_theta[115] | -1.815871e-01 | 2.955023e-02 | 2.283231e-01 | 5.850115e-01 |
| log_theta[116] | -6.268575e-01 | -3.362887e-01 | -6.823923e-02 | 3.838213e-01 |
| log_theta[117] | -1.131139e-01 | 4.642643e-02 | 1.965510e-01 | 4.652989e-01 |
| log_theta[118] | -1.306231e+00 | -1.111265e+00 | -9.232845e-01 | -6.054844e-01 |
| log_theta[119] | -8.149133e-02 | 6.738447e-02 | 2.088080e-01 | 4.592942e-01 |
| log_theta[120] | -3.890984e-01 | -1.088667e-01 | 1.748160e-01 | 6.148057e-01 |
| log_theta[121] | 2.290890e-02 | 2.447008e-01 | 4.441371e-01 | 8.108563e-01 |
| log_theta[122] | -1.491715e+00 | -1.128543e+00 | -7.965115e-01 | -2.690089e-01 |
| log_theta[123] | -3.843926e-01 | -1.816364e-01 | 1.030476e-02 | 3.444204e-01 |
| log_theta[124] | -7.732561e-01 | -5.600301e-01 | -3.560087e-01 | 1.048802e-02 |
| log_theta[125] | -3.805472e-02 | 1.709153e-01 | 3.615827e-01 | 6.995765e-01 |
| log_theta[126] | -5.290378e-01 | -2.582112e-01 | -3.351977e-03 | 4.163608e-01 |
| log_theta[127] | -4.640595e-01 | -2.658778e-01 | -8.198929e-02 | 2.396657e-01 |
| log_theta[128] | -3.489231e-01 | -6.818443e-02 | 2.094184e-01 | 6.684016e-01 |
| log_theta[129] | -4.163385e-01 | -2.575731e-01 | -1.011846e-01 | 1.548400e-01 |
| log_theta[130] | -3.590477e-01 | -1.824210e-01 | -1.189693e-02 | 2.831717e-01 |
| log_theta[131] | -3.629549e-01 | -7.024692e-02 | 2.179757e-01 | 7.017814e-01 |
| log_theta[132] | -2.545084e-01 | -1.997308e-02 | 2.061958e-01 | 5.737234e-01 |
| log_theta[133] | -3.709589e-01 | -1.302535e-01 | 8.576005e-02 | 4.462831e-01 |
| log_theta[134] | -6.248833e-01 | -3.531612e-01 | -1.009194e-01 | 3.211715e-01 |
| log_theta[135] | -5.457545e-01 | -2.333241e-01 | 5.226897e-02 | 5.173967e-01 |
| log_theta[136] | -4.815727e-01 | -1.587945e-01 | 1.352319e-01 | 6.489989e-01 |
| log_theta[137] | -1.257046e+00 | -8.943535e-01 | -5.516692e-01 | 2.064589e-02 |
| log_theta[138] | 2.668524e-02 | 2.141313e-01 | 3.949588e-01 | 7.246800e-01 |
| log_theta[139] | -2.550198e-01 | -5.949282e-02 | 1.221968e-01 | 4.430776e-01 |
| log_theta[140] | 1.845099e-02 | 2.205401e-01 | 4.111865e-01 | 7.373412e-01 |
| log_theta[141] | -3.316723e-01 | -9.191679e-02 | 1.144256e-01 | 4.786240e-01 |

| | | | | |
|---|---|---|---|---|
| log_theta[142] | -1.557911e-01 | 9.297722e-02 | 3.359338e-01 | 7.554018e-01 |
| log_theta[143] | -5.351480e-01 | -2.853120e-01 | -5.597010e-02 | 3.405095e-01 |
| log_theta[144] | -4.592970e-01 | -2.190223e-01 | 2.136226e-03 | 3.762132e-01 |
| log_theta[145] | 2.578999e-02 | 2.191353e-01 | 4.075050e-01 | 7.228108e-01 |
| log_theta[146] | -3.873832e-01 | -1.868874e-01 | -2.071800e-03 | 3.287532e-01 |
| log_theta[147] | 1.069783e-01 | 2.491419e-01 | 3.804814e-01 | 6.366953e-01 |
| log_theta[148] | -6.389638e-01 | -3.888478e-01 | -1.538174e-01 | 2.616004e-01 |
| log_theta[149] | 5.598459e-01 | 7.439260e-01 | 9.047653e-01 | 1.213735e+00 |
| log_theta[150] | -7.874550e-01 | -6.898525e-01 | -5.974955e-01 | -4.235383e-01 |
| log_theta[151] | -6.882332e-01 | -4.543245e-01 | -2.384876e-01 | 1.081103e-01 |
| log_theta[152] | -3.050229e-02 | 1.261453e-01 | 2.853918e-01 | 5.585214e-01 |
| log_theta[153] | 4.191363e-01 | 6.213850e-01 | 8.063677e-01 | 1.143527e+00 |
| log_theta[154] | 1.839008e-01 | 3.657628e-01 | 5.412294e-01 | 8.476086e-01 |
| log_theta[155] | -2.832715e-01 | -1.035273e-01 | 5.580603e-02 | 3.753018e-01 |
| log_theta[156] | -4.565204e-01 | -2.838080e-01 | -1.103360e-01 | 1.910332e-01 |
| log_theta[157] | -8.908624e-01 | -5.482347e-01 | -2.460457e-01 | 2.830386e-01 |
| log_theta[158] | -9.093223e-01 | -6.842831e-01 | -4.790786e-01 | -1.189444e-01 |
| log_theta[159] | -7.660374e-02 | 8.944162e-02 | 2.593605e-01 | 5.575949e-01 |
| log_theta[160] | -5.448390e-01 | -2.735321e-01 | -3.084813e-02 | 4.048746e-01 |
| log_theta[161] | -3.225125e-01 | -1.399293e-01 | 2.488185e-02 | 3.412729e-01 |
| log_theta[162] | -4.030869e-01 | -2.172511e-01 | -3.819410e-02 | 2.787102e-01 |
| log_theta[163] | -2.884515e-01 | -8.647841e-02 | 9.990328e-02 | 4.228449e-01 |
| log_theta[164] | -1.995524e-01 | 3.609259e-02 | 2.600869e-01 | 6.193100e-01 |
| log_theta[165] | -5.077874e-01 | -3.070201e-01 | -1.186017e-01 | 2.116395e-01 |
| log_theta[166] | -6.072943e-01 | -3.144381e-01 | -4.730435e-02 | 4.125546e-01 |
| log_theta[167] | 1.520736e-01 | 3.818608e-01 | 5.948927e-01 | 9.632160e-01 |
| log_theta[168] | -4.565561e-01 | -2.264539e-01 | 3.935379e-03 | 3.672217e-01 |
| log_theta[169] | -1.626133e+00 | -1.490701e+00 | -1.354382e+00 | -1.115058e+00 |
| log_theta[170] | -8.647720e-02 | 1.318271e-01 | 3.389533e-01 | 6.876881e-01 |
| log_theta[171] | -1.094716e+00 | -7.316644e-01 | -3.840930e-01 | 1.760065e-01 |
| log_theta[172] | 1.607747e-02 | 2.309252e-01 | 4.290619e-01 | 7.854970e-01 |
| log_theta[173] | -5.526824e-01 | -2.945848e-01 | -6.765240e-02 | 3.567393e-01 |
| log_theta[174] | -4.820083e-01 | -2.667391e-01 | -6.758806e-02 | 2.824550e-01 |
| log_theta[175] | -6.442750e-01 | -4.486953e-01 | -2.656029e-01 | 4.884657e-02 |
| log_theta[176] | -5.564672e-01 | -3.312610e-01 | -1.203080e-01 | 2.393491e-01 |
| log_theta[177] | 3.348926e-01 | 5.425155e-01 | 7.375100e-01 | 1.080846e+00 |
| log_theta[178] | -8.140802e-01 | -6.987243e-01 | -5.890411e-01 | -3.719925e-01 |
| log_theta[179] | -7.899440e-01 | -5.104475e-01 | -2.591238e-01 | 1.804442e-01 |
| log_theta[180] | -3.149688e-01 | -1.210072e-01 | 6.482165e-02 | 3.909376e-01 |
| log_theta[181] | -4.715769e-01 | -2.351068e-01 | -1.595568e-02 | 3.484644e-01 |
| log_theta[182] | -4.701926e-01 | -2.661384e-01 | -7.483676e-02 | 2.578292e-01 |
| log_theta[183] | -1.894077e-01 | 7.359814e-03 | 1.967001e-01 | 5.443823e-01 |
| log_theta[184] | -2.117009e+00 | -1.664734e+00 | -1.241854e+00 | -5.362913e-01 |

| | | | | |
|---|---|---|---|---|
| log_theta[185] | -3.829014e-01 | -1.498052e-01 | 5.737094e-02 | 4.267466e-01 |
| log_theta[186] | -1.022982e+00 | -7.036144e-01 | -3.836373e-01 | 1.064207e-01 |
| log_theta[187] | -5.461009e-01 | -3.488803e-01 | -1.561631e-01 | 1.628413e-01 |
| log_theta[188] | -1.186928e-01 | 8.020130e-02 | 2.627430e-01 | 6.138830e-01 |
| log_theta[189] | -2.359800e-02 | 1.943627e-01 | 3.994487e-01 | 7.382073e-01 |
| log_theta[190] | -8.029503e-01 | -5.115547e-01 | -2.440634e-01 | 2.098153e-01 |
| log_theta[191] | -7.202823e-01 | -4.224147e-01 | -1.502602e-01 | 3.383808e-01 |
| log_theta[192] | -6.641786e-01 | -4.344496e-01 | -2.095255e-01 | 1.972598e-01 |
| log_theta[193] | -2.565011e-01 | -3.582560e-02 | 1.829484e-01 | 5.423620e-01 |
| log_theta[194] | -6.304630e-01 | -5.096400e-01 | -3.940324e-01 | -1.751624e-01 |
| log_theta[195] | -1.022955e+00 | -9.585887e-01 | -8.958714e-01 | -7.850805e-01 |
| log_lambda[1] | 1.338694e+00 | 1.617257e+00 | 1.873995e+00 | 2.317646e+00 |
| log_lambda[2] | 2.327401e+00 | 2.521708e+00 | 2.692891e+00 | 2.999895e+00 |
| log_lambda[3] | 2.671992e+00 | 2.838227e+00 | 3.001135e+00 | 3.280567e+00 |
| log_lambda[4] | 1.335487e+00 | 1.616003e+00 | 1.878593e+00 | 2.327158e+00 |
| log_lambda[5] | 1.995053e+00 | 2.208043e+00 | 2.414711e+00 | 2.763350e+00 |
| log_lambda[6] | 2.751873e+00 | 2.911298e+00 | 3.061728e+00 | 3.318877e+00 |
| log_lambda[7] | 3.212174e+00 | 3.342621e+00 | 3.464160e+00 | 3.679485e+00 |
| log_lambda[8] | 2.106838e+00 | 2.327347e+00 | 2.534535e+00 | 2.879704e+00 |
| log_lambda[9] | 2.458315e+00 | 2.635524e+00 | 2.801808e+00 | 3.101745e+00 |
| log_lambda[10] | 2.896172e+00 | 3.037657e+00 | 3.178927e+00 | 3.429327e+00 |
| log_lambda[11] | 1.025401e+00 | 1.342437e+00 | 1.646807e+00 | 2.130561e+00 |
| log_lambda[12] | 2.082861e+00 | 2.294504e+00 | 2.482666e+00 | 2.839359e+00 |
| log_lambda[13] | 2.071852e+00 | 2.271060e+00 | 2.469126e+00 | 2.816598e+00 |
| log_lambda[14] | 2.902037e+00 | 3.043498e+00 | 3.181521e+00 | 3.438804e+00 |
| log_lambda[15] | 2.317827e+00 | 2.508870e+00 | 2.694479e+00 | 3.015869e+00 |
| log_lambda[16] | 2.366643e+00 | 2.545348e+00 | 2.717898e+00 | 3.035679e+00 |
| log_lambda[17] | 2.574889e+00 | 2.744200e+00 | 2.905515e+00 | 3.191614e+00 |
| log_lambda[18] | 2.851907e+00 | 3.004096e+00 | 3.140253e+00 | 3.396153e+00 |
| log_lambda[19] | 3.063738e+00 | 3.198761e+00 | 3.338227e+00 | 3.581439e+00 |
| log_lambda[20] | 1.383454e+00 | 1.663875e+00 | 1.921371e+00 | 2.354638e+00 |
| log_lambda[21] | 2.065947e+00 | 2.283664e+00 | 2.485695e+00 | 2.841995e+00 |
| log_lambda[22] | 2.824960e+00 | 2.979642e+00 | 3.121492e+00 | 3.394096e+00 |
| log_lambda[23] | 2.317652e+00 | 2.502843e+00 | 2.686644e+00 | 2.989616e+00 |
| log_lambda[24] | 1.291474e+00 | 1.585247e+00 | 1.842362e+00 | 2.302338e+00 |
| log_lambda[25] | 2.753841e+00 | 2.912766e+00 | 3.060720e+00 | 3.327934e+00 |
| log_lambda[26] | 2.662149e+00 | 2.824888e+00 | 2.976213e+00 | 3.260232e+00 |
| log_lambda[27] | 2.389216e+00 | 2.573807e+00 | 2.743085e+00 | 3.030014e+00 |
| log_lambda[28] | 2.602132e+00 | 2.764430e+00 | 2.921035e+00 | 3.211555e+00 |
| log_lambda[29] | 6.770281e-01 | 1.025986e+00 | 1.345084e+00 | 1.902924e+00 |
| log_lambda[30] | 2.004331e+00 | 2.212299e+00 | 2.415441e+00 | 2.778150e+00 |
| log_lambda[31] | 1.603870e+00 | 1.869479e+00 | 2.114763e+00 | 2.492133e+00 |
| log_lambda[32] | 8.344690e-01 | 1.159916e+00 | 1.471778e+00 | 2.017265e+00 |

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|---|---|---|---|---|
| log_lambda[33] | 2.198854e+00 | 2.388422e+00 | 2.572115e+00 | 2.905694e+00 |
| log_lambda[34] | 2.121099e+00 | 2.326444e+00 | 2.518825e+00 | 2.869556e+00 |
| log_lambda[35] | 1.487824e+00 | 1.756347e+00 | 2.001228e+00 | 2.427818e+00 |
| log_lambda[36] | 2.616564e+00 | 2.784119e+00 | 2.937420e+00 | 3.215500e+00 |
| log_lambda[37] | 2.306359e+00 | 2.491048e+00 | 2.677597e+00 | 2.985217e+00 |
| log_lambda[38] | 1.485849e+00 | 1.751969e+00 | 1.999344e+00 | 2.448458e+00 |
| log_lambda[39] | 1.956878e+00 | 2.183878e+00 | 2.393811e+00 | 2.750098e+00 |
| log_lambda[40] | 2.014034e+00 | 2.221261e+00 | 2.427999e+00 | 2.793373e+00 |
| log_lambda[41] | 1.136442e+00 | 1.438812e+00 | 1.716700e+00 | 2.174320e+00 |
| log_lambda[42] | 1.966114e+00 | 2.187441e+00 | 2.396210e+00 | 2.724899e+00 |
| log_lambda[43] | 2.166951e+00 | 2.360137e+00 | 2.549141e+00 | 2.888964e+00 |
| log_lambda[44] | 2.282448e+00 | 2.474212e+00 | 2.655044e+00 | 2.976390e+00 |
| log_lambda[45] | 2.937210e+00 | 3.080209e+00 | 3.219255e+00 | 3.456730e+00 |
| log_lambda[46] | 2.711073e+00 | 2.874901e+00 | 3.032549e+00 | 3.310525e+00 |
| log_lambda[47] | 2.227511e+00 | 2.419688e+00 | 2.608409e+00 | 2.936855e+00 |
| log_lambda[48] | 1.516664e+00 | 1.771205e+00 | 2.027276e+00 | 2.453672e+00 |
| log_lambda[49] | 2.342146e+00 | 2.530052e+00 | 2.697794e+00 | 3.035113e+00 |
| log_lambda[50] | 2.273382e+00 | 2.452109e+00 | 2.637834e+00 | 2.958764e+00 |
| log_lambda[51] | 2.277374e+00 | 2.479617e+00 | 2.671301e+00 | 3.006292e+00 |
| log_lambda[52] | 2.351143e+00 | 2.533824e+00 | 2.714462e+00 | 3.018608e+00 |
| log_lambda[53] | 1.561548e+00 | 1.824919e+00 | 2.063020e+00 | 2.481481e+00 |
| log_lambda[54] | 2.357279e+00 | 2.544251e+00 | 2.719512e+00 | 3.009194e+00 |
| log_lambda[55] | 1.558019e+00 | 1.813779e+00 | 2.061499e+00 | 2.485329e+00 |
| log_lambda[56] | 2.726540e+00 | 2.882280e+00 | 3.026735e+00 | 3.295370e+00 |
| log_lambda[57] | 2.276595e+00 | 2.464922e+00 | 2.648415e+00 | 2.975415e+00 |
| log_lambda[58] | 2.006023e+00 | 2.218480e+00 | 2.420435e+00 | 2.770358e+00 |
| log_lambda[59] | 1.507044e+00 | 1.775475e+00 | 2.029657e+00 | 2.452398e+00 |
| log_lambda[60] | 1.708414e+00 | 1.959048e+00 | 2.197875e+00 | 2.591885e+00 |
| log_lambda[61] | 1.660883e+00 | 1.911280e+00 | 2.125539e+00 | 2.544138e+00 |
| log_lambda[62] | 1.485805e+00 | 1.759993e+00 | 2.016009e+00 | 2.451187e+00 |
| log_lambda[63] | 2.590936e+00 | 2.761749e+00 | 2.924452e+00 | 3.220882e+00 |
| log_lambda[64] | 1.097599e+00 | 1.388819e+00 | 1.671251e+00 | 2.175506e+00 |
| log_lambda[65] | 1.419860e+00 | 1.703898e+00 | 1.954306e+00 | 2.401593e+00 |
| log_lambda[66] | 2.258487e+00 | 2.454793e+00 | 2.628097e+00 | 2.957168e+00 |
| log_lambda[67] | 1.212965e+00 | 1.507748e+00 | 1.785925e+00 | 2.249939e+00 |
| log_lambda[68] | 1.257970e+00 | 1.558712e+00 | 1.810101e+00 | 2.260580e+00 |
| log_lambda[69] | 2.652322e+00 | 2.823503e+00 | 2.977545e+00 | 3.260733e+00 |
| log_lambda[70] | 1.285598e+00 | 1.573159e+00 | 1.826452e+00 | 2.305475e+00 |
| log_lambda[71] | 1.632300e+00 | 1.883832e+00 | 2.115615e+00 | 2.533164e+00 |
| log_lambda[72] | 5.036452e-01 | 8.724792e-01 | 1.215776e+00 | 1.818324e+00 |
| log_lambda[73] | 1.884542e+00 | 2.104931e+00 | 2.318121e+00 | 2.689231e+00 |
| log_lambda[74] | 1.759832e+00 | 1.999407e+00 | 2.225299e+00 | 2.600250e+00 |
| log_lambda[75] | 1.424347e+00 | 1.702198e+00 | 1.947675e+00 | 2.383098e+00 |

| | | | | |
|---|---|---|---|---|
| log_lambda[76] | 2.214866e+00 | 2.415489e+00 | 2.590371e+00 | 2.928479e+00 |
| log_lambda[77] | 2.365491e+00 | 2.542451e+00 | 2.718924e+00 | 3.033718e+00 |
| log_lambda[78] | 2.608693e+00 | 2.771285e+00 | 2.927058e+00 | 3.201244e+00 |
| log_lambda[79] | 1.190990e+00 | 1.485938e+00 | 1.767271e+00 | 2.208129e+00 |
| log_lambda[80] | 1.134961e+00 | 1.429695e+00 | 1.714651e+00 | 2.188759e+00 |
| log_lambda[81] | 1.455409e+00 | 1.732185e+00 | 1.990893e+00 | 2.436147e+00 |
| log_lambda[82] | 2.202783e+00 | 2.402398e+00 | 2.593076e+00 | 2.910845e+00 |
| log_lambda[83] | 2.017808e+00 | 2.229661e+00 | 2.434481e+00 | 2.785511e+00 |
| log_lambda[84] | 2.538430e+00 | 2.712139e+00 | 2.869563e+00 | 3.149214e+00 |
| log_lambda[85] | 2.024482e+00 | 2.237866e+00 | 2.436950e+00 | 2.790074e+00 |
| log_lambda[86] | 2.569323e+00 | 2.730188e+00 | 2.887307e+00 | 3.179729e+00 |
| log_lambda[87] | 2.476247e+00 | 2.660042e+00 | 2.829717e+00 | 3.129793e+00 |
| log_lambda[88] | 2.686905e+00 | 2.853922e+00 | 2.999853e+00 | 3.284546e+00 |
| log_lambda[89] | 1.329500e+00 | 1.604088e+00 | 1.870720e+00 | 2.310940e+00 |
| log_lambda[90] | 2.217545e+00 | 2.415154e+00 | 2.611699e+00 | 2.942812e+00 |
| log_lambda[91] | 1.590312e+00 | 1.847729e+00 | 2.094842e+00 | 2.510727e+00 |
| log_lambda[92] | 1.773480e+00 | 2.027726e+00 | 2.247306e+00 | 2.631577e+00 |
| log_lambda[93] | 3.374574e+00 | 3.486277e+00 | 3.597076e+00 | 3.813712e+00 |
| log_lambda[94] | 2.465584e+00 | 2.643029e+00 | 2.811325e+00 | 3.107770e+00 |
| log_lambda[95] | 2.414595e+00 | 2.593407e+00 | 2.759804e+00 | 3.074152e+00 |
| log_lambda[96] | 2.675946e+00 | 2.844092e+00 | 2.997849e+00 | 3.253295e+00 |
| log_lambda[97] | 3.054875e+00 | 3.187471e+00 | 3.313552e+00 | 3.543703e+00 |
| log_lambda[98] | 2.417054e+00 | 2.603497e+00 | 2.778534e+00 | 3.058706e+00 |
| log_lambda[99] | 5.240032e-01 | 9.056494e-01 | 1.269489e+00 | 1.844341e+00 |
| log_lambda[100] | 4.203605e+00 | 4.286979e+00 | 4.366274e+00 | 4.513787e+00 |
| log_lambda[101] | 2.322177e+00 | 2.514357e+00 | 2.695068e+00 | 2.992517e+00 |
| log_lambda[102] | 2.424706e+00 | 2.609925e+00 | 2.777947e+00 | 3.069120e+00 |
| log_lambda[103] | 1.439511e+00 | 1.698273e+00 | 1.963646e+00 | 2.380740e+00 |
| log_lambda[104] | 2.818748e+00 | 2.972227e+00 | 3.117481e+00 | 3.376269e+00 |
| log_lambda[105] | 1.814475e+00 | 2.046299e+00 | 2.260828e+00 | 2.667085e+00 |
| log_lambda[106] | 2.255628e+00 | 2.451557e+00 | 2.642252e+00 | 2.959416e+00 |
| log_lambda[107] | 2.000818e+00 | 2.218473e+00 | 2.426463e+00 | 2.774352e+00 |
| log_lambda[108] | 8.420142e-01 | 1.180382e+00 | 1.487342e+00 | 2.042379e+00 |
| log_lambda[109] | 2.173818e+00 | 2.371364e+00 | 2.565567e+00 | 2.871332e+00 |
| log_lambda[110] | 7.638714e-01 | 1.123678e+00 | 1.454920e+00 | 1.999029e+00 |
| log_lambda[111] | 2.144943e+00 | 2.348561e+00 | 2.544636e+00 | 2.860003e+00 |
| log_lambda[112] | 2.334668e+00 | 2.539915e+00 | 2.723699e+00 | 3.031466e+00 |
| log_lambda[113] | 2.174374e+00 | 2.370946e+00 | 2.572016e+00 | 2.902011e+00 |
| log_lambda[114] | 2.349742e+00 | 2.534851e+00 | 2.712082e+00 | 3.027458e+00 |
| log_lambda[115] | 2.044117e+00 | 2.255254e+00 | 2.454027e+00 | 2.810716e+00 |
| log_lambda[116] | 1.310444e+00 | 1.601013e+00 | 1.869063e+00 | 2.321123e+00 |
| log_lambda[117] | 2.709455e+00 | 2.868995e+00 | 3.019120e+00 | 3.287868e+00 |
| log_lambda[118] | 2.205016e+00 | 2.399982e+00 | 2.587962e+00 | 2.905763e+00 |

| | | | | |
|---|---|---|---|---|
| log_lambda[119] | 2.958736e+00 | 3.107612e+00 | 3.249036e+00 | 3.499522e+00 |
| log_lambda[120] | 1.282375e+00 | 1.562607e+00 | 1.846289e+00 | 2.286279e+00 |
| log_lambda[121] | 1.935410e+00 | 2.157202e+00 | 2.356638e+00 | 2.723357e+00 |
| log_lambda[122] | 6.716081e-01 | 1.034780e+00 | 1.366812e+00 | 1.894314e+00 |
| log_lambda[123] | 2.175931e+00 | 2.378687e+00 | 2.570628e+00 | 2.904744e+00 |
| log_lambda[124] | 2.003698e+00 | 2.216924e+00 | 2.420945e+00 | 2.787442e+00 |
| log_lambda[125] | 2.144620e+00 | 2.353590e+00 | 2.544258e+00 | 2.882251e+00 |
| log_lambda[126] | 1.523803e+00 | 1.794630e+00 | 2.049489e+00 | 2.469202e+00 |
| log_lambda[127] | 2.216962e+00 | 2.415144e+00 | 2.599032e+00 | 2.920687e+00 |
| log_lambda[128] | 1.280317e+00 | 1.561056e+00 | 1.838659e+00 | 2.297642e+00 |
| log_lambda[129] | 2.779064e+00 | 2.937829e+00 | 3.094218e+00 | 3.350242e+00 |
| log_lambda[130] | 2.519026e+00 | 2.695653e+00 | 2.866177e+00 | 3.161246e+00 |
| log_lambda[131] | 1.033290e+00 | 1.325998e+00 | 1.614220e+00 | 2.098026e+00 |
| log_lambda[132] | 1.804730e+00 | 2.039266e+00 | 2.265435e+00 | 2.632962e+00 |
| log_lambda[133] | 1.920565e+00 | 2.161271e+00 | 2.377284e+00 | 2.737807e+00 |
| log_lambda[134] | 1.509283e+00 | 1.781005e+00 | 2.033247e+00 | 2.455338e+00 |
| log_lambda[135] | 1.075612e+00 | 1.388042e+00 | 1.673635e+00 | 2.138763e+00 |
| log_lambda[136] | 1.020280e+00 | 1.343058e+00 | 1.637085e+00 | 2.150852e+00 |
| log_lambda[137] | 5.755360e-01 | 9.382279e-01 | 1.280912e+00 | 1.853227e+00 |
| log_lambda[138] | 2.241531e+00 | 2.428977e+00 | 2.609805e+00 | 2.939526e+00 |
| log_lambda[139] | 2.260254e+00 | 2.455781e+00 | 2.637471e+00 | 2.958352e+00 |
| log_lambda[140] | 2.146683e+00 | 2.348772e+00 | 2.539418e+00 | 2.865573e+00 |
| log_lambda[141] | 1.926961e+00 | 2.166716e+00 | 2.373059e+00 | 2.737257e+00 |
| log_lambda[142] | 1.607226e+00 | 1.855994e+00 | 2.098951e+00 | 2.518419e+00 |
| log_lambda[143] | 1.685142e+00 | 1.934978e+00 | 2.164320e+00 | 2.560799e+00 |
| log_lambda[144] | 1.806624e+00 | 2.046899e+00 | 2.268057e+00 | 2.642134e+00 |
| log_lambda[145] | 2.232965e+00 | 2.426310e+00 | 2.614680e+00 | 2.929986e+00 |
| log_lambda[146] | 2.172940e+00 | 2.373436e+00 | 2.558251e+00 | 2.889077e+00 |
| log_lambda[147] | 2.964597e+00 | 3.106761e+00 | 3.238100e+00 | 3.494314e+00 |
| log_lambda[148] | 1.692209e+00 | 1.942325e+00 | 2.177355e+00 | 2.592773e+00 |
| log_lambda[149] | 2.525559e+00 | 2.709639e+00 | 2.870478e+00 | 3.179448e+00 |
| log_lambda[150] | 3.739754e+00 | 3.837356e+00 | 3.929713e+00 | 4.103670e+00 |
| log_lambda[151] | 1.971327e+00 | 2.205236e+00 | 2.421072e+00 | 2.767670e+00 |
| log_lambda[152] | 2.717409e+00 | 2.874057e+00 | 3.033303e+00 | 3.306433e+00 |
| log_lambda[153] | 2.210896e+00 | 2.413145e+00 | 2.598127e+00 | 2.935286e+00 |
| log_lambda[154] | 2.329832e+00 | 2.511694e+00 | 2.687161e+00 | 2.993540e+00 |
| log_lambda[155] | 2.439339e+00 | 2.619083e+00 | 2.778416e+00 | 3.097912e+00 |
| log_lambda[156] | 2.456917e+00 | 2.629629e+00 | 2.803101e+00 | 3.104470e+00 |
| log_lambda[157] | 8.618097e-01 | 1.204437e+00 | 1.506626e+00 | 2.035711e+00 |
| log_lambda[158] | 2.001397e+00 | 2.226436e+00 | 2.431640e+00 | 2.791774e+00 |
| log_lambda[159] | 2.500578e+00 | 2.666624e+00 | 2.836542e+00 | 3.134777e+00 |
| log_lambda[160] | 1.495082e+00 | 1.766389e+00 | 2.009073e+00 | 2.444795e+00 |
| log_lambda[161] | 2.359194e+00 | 2.541777e+00 | 2.706588e+00 | 3.022979e+00 |

| | | | | |
|---|---|---|---|---|
| log_lambda[162] | 2.360083e+00 | 2.545918e+00 | 2.724975e+00 | 3.041880e+00 |
| log_lambda[163] | 2.258647e+00 | 2.460620e+00 | 2.647002e+00 | 2.969944e+00 |
| log_lambda[164] | 1.803278e+00 | 2.038923e+00 | 2.262917e+00 | 2.622140e+00 |
| log_lambda[165] | 2.190886e+00 | 2.391653e+00 | 2.580071e+00 | 2.910313e+00 |
| log_lambda[166] | 1.330007e+00 | 1.622864e+00 | 1.889997e+00 | 2.349856e+00 |
| log_lambda[167] | 1.885497e+00 | 2.115285e+00 | 2.328317e+00 | 2.696640e+00 |
| log_lambda[168] | 1.833956e+00 | 2.064059e+00 | 2.294448e+00 | 2.657734e+00 |
| log_lambda[169] | 3.000407e+00 | 3.135839e+00 | 3.272158e+00 | 3.511483e+00 |
| log_lambda[170] | 1.945611e+00 | 2.163915e+00 | 2.371041e+00 | 2.719776e+00 |
| log_lambda[171] | 5.403896e-01 | 9.034412e-01 | 1.251013e+00 | 1.811112e+00 |
| log_lambda[172] | 2.041591e+00 | 2.256438e+00 | 2.454575e+00 | 2.811010e+00 |
| log_lambda[173] | 1.526759e+00 | 1.784857e+00 | 2.011789e+00 | 2.436181e+00 |
| log_lambda[174] | 2.068998e+00 | 2.284267e+00 | 2.483418e+00 | 2.833461e+00 |
| log_lambda[175] | 2.286919e+00 | 2.482498e+00 | 2.665591e+00 | 2.980040e+00 |
| log_lambda[176] | 1.955568e+00 | 2.180774e+00 | 2.391727e+00 | 2.751384e+00 |
| log_lambda[177] | 2.106449e+00 | 2.314072e+00 | 2.509067e+00 | 2.852403e+00 |
| log_lambda[178] | 3.354753e+00 | 3.470109e+00 | 3.579792e+00 | 3.796841e+00 |
| log_lambda[179] | 1.364141e+00 | 1.643638e+00 | 1.894961e+00 | 2.334529e+00 |
| log_lambda[180] | 2.177410e+00 | 2.371371e+00 | 2.557200e+00 | 2.883316e+00 |
| log_lambda[181] | 1.936269e+00 | 2.172739e+00 | 2.391890e+00 | 2.756310e+00 |
| log_lambda[182] | 2.175982e+00 | 2.380036e+00 | 2.571338e+00 | 2.904004e+00 |
| log_lambda[183] | 2.160061e+00 | 2.356828e+00 | 2.546169e+00 | 2.893851e+00 |
| log_lambda[184] | -1.710993e-01 | 2.811764e-01 | 7.040559e-01 | 1.409619e+00 |
| log_lambda[185] | 1.942423e+00 | 2.175519e+00 | 2.382696e+00 | 2.752071e+00 |
| log_lambda[186] | 8.968779e-01 | 1.216245e+00 | 1.536222e+00 | 2.026280e+00 |
| log_lambda[187] | 2.208197e+00 | 2.405417e+00 | 2.598134e+00 | 2.917139e+00 |
| log_lambda[188] | 2.148265e+00 | 2.347159e+00 | 2.529701e+00 | 2.880841e+00 |
| log_lambda[189] | 2.127001e+00 | 2.344961e+00 | 2.550047e+00 | 2.888806e+00 |
| log_lambda[190] | 1.316913e+00 | 1.608309e+00 | 1.875800e+00 | 2.329679e+00 |
| log_lambda[191] | 1.081427e+00 | 1.379295e+00 | 1.651450e+00 | 2.140091e+00 |
| log_lambda[192] | 1.846233e+00 | 2.075962e+00 | 2.300886e+00 | 2.707672e+00 |
| log_lambda[193] | 1.930673e+00 | 2.151349e+00 | 2.370123e+00 | 2.729536e+00 |
| log_lambda[194] | 3.283558e+00 | 3.404381e+00 | 3.519989e+00 | 3.738859e+00 |
| log_lambda[195] | 4.640005e+00 | 4.704372e+00 | 4.767089e+00 | 4.877880e+00 |
| log_lik[1] | -2.264848e+00 | -1.919783e+00 | -1.780013e+00 | -1.740705e+00 |
| log_lik[2] | -2.808267e+00 | -2.419166e+00 | -2.253212e+00 | -2.208362e+00 |
| log_lik[3] | -3.068389e+00 | -2.615499e+00 | -2.425856e+00 | -2.369329e+00 |
| log_lik[4] | -2.283491e+00 | -1.924317e+00 | -1.781823e+00 | -1.740704e+00 |
| log_lik[5] | -2.703144e+00 | -2.309322e+00 | -2.131253e+00 | -2.079231e+00 |
| log_lik[6] | -2.982882e+00 | -2.589952e+00 | -2.421305e+00 | -2.369364e+00 |
| log_lik[7] | -3.258192e+00 | -2.831152e+00 | -2.659335e+00 | -2.605796e+00 |
| log_lik[8] | -2.734569e+00 | -2.311640e+00 | -2.132511e+00 | -2.079079e+00 |
| log_lik[9] | -2.956855e+00 | -2.514857e+00 | -2.327929e+00 | -2.278905e+00 |

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log_lik[10]     -3.131479e+00 -2.705177e+00 -2.522144e+00 -2.468832e+00
log_lik[11]     -2.176999e+00 -1.820963e+00 -1.674326e+00 -1.633249e+00
log_lik[12]     -2.823570e+00 -2.361827e+00 -2.175228e+00 -2.125861e+00
log_lik[13]     -2.645283e+00 -2.271365e+00 -2.122799e+00 -2.079082e+00
log_lik[14]     -3.147539e+00 -2.683177e+00 -2.516187e+00 -2.468680e+00
log_lik[15]     -2.864765e+00 -2.445283e+00 -2.259327e+00 -2.208358e+00
log_lik[16]     -2.966925e+00 -2.482306e+00 -2.297426e+00 -2.244891e+00
log_lik[17]     -3.083074e+00 -2.604384e+00 -2.396684e+00 -2.341058e+00
log_lik[18]     -3.098216e+00 -2.665741e+00 -2.488278e+00 -2.445540e+00
log_lik[19]     -3.184227e+00 -2.764456e+00 -2.579353e+00 -2.532146e+00
log_lik[20]     -2.468594e+00 -2.047165e+00 -1.877839e+00 -1.829379e+00
log_lik[21]     -2.861788e+00 -2.378188e+00 -2.182887e+00 -2.126044e+00
log_lik[22]     -3.181412e+00 -2.684220e+00 -2.498718e+00 -2.445644e+00
log_lik[23]     -2.857593e+00 -2.436249e+00 -2.257161e+00 -2.208291e+00
log_lik[24]     -2.301877e+00 -1.924904e+00 -1.780838e+00 -1.740640e+00
log_lik[25]     -3.054021e+00 -2.620045e+00 -2.440885e+00 -2.395953e+00
log_lik[26]     -3.108085e+00 -2.598682e+00 -2.418581e+00 -2.369165e+00
log_lik[27]     -2.894756e+00 -2.465132e+00 -2.292052e+00 -2.245001e+00
log_lik[28]     -2.979967e+00 -2.563619e+00 -2.391526e+00 -2.341096e+00
log_lik[29]     -1.985415e+00 -1.662611e+00 -1.531343e+00 -1.496263e+00
log_lik[30]     -2.720123e+00 -2.300032e+00 -2.128384e+00 -2.079075e+00
log_lik[31]     -2.551661e+00 -2.138781e+00 -1.955349e+00 -1.904303e+00
log_lik[32]     -1.962338e+00 -1.656492e+00 -1.528910e+00 -1.496204e+00
log_lik[33]     -2.850329e+00 -2.400085e+00 -2.219663e+00 -2.168761e+00
log_lik[34]     -2.768389e+00 -2.362577e+00 -2.173572e+00 -2.126053e+00
log_lik[35]     -2.432893e+00 -2.023401e+00 -1.866369e+00 -1.829169e+00
log_lik[36]     -2.915348e+00 -2.517043e+00 -2.359021e+00 -2.310951e+00
log_lik[37]     -2.856077e+00 -2.431292e+00 -2.260631e+00 -2.208232e+00
log_lik[38]     -2.395446e+00 -2.023062e+00 -1.875282e+00 -1.829131e+00
log_lik[39]     -2.620834e+00 -2.236785e+00 -2.073052e+00 -2.027176e+00
log_lik[40]     -2.712203e+00 -2.299010e+00 -2.129572e+00 -2.078967e+00
log_lik[41]     -2.139629e+00 -1.806112e+00 -1.671909e+00 -1.633243e+00
log_lik[42]     -2.588427e+00 -2.233527e+00 -2.076129e+00 -2.027136e+00
log_lik[43]     -2.731532e+00 -2.321856e+00 -2.170110e+00 -2.126184e+00
log_lik[44]     -2.760921e+00 -2.376680e+00 -2.214131e+00 -2.168829e+00
log_lik[45]     -3.162754e+00 -2.725696e+00 -2.542801e+00 -2.490766e+00
log_lik[46]     -3.034076e+00 -2.601080e+00 -2.414578e+00 -2.369248e+00
log_lik[47]     -2.808548e+00 -2.396789e+00 -2.219144e+00 -2.168875e+00
log_lik[48]     -2.635613e+00 -2.162911e+00 -1.962264e+00 -1.904239e+00
log_lik[49]     -2.826646e+00 -2.413609e+00 -2.253468e+00 -2.208357e+00
log_lik[50]     -2.759294e+00 -2.366610e+00 -2.215370e+00 -2.168744e+00
log_lik[51]     -2.836245e+00 -2.401258e+00 -2.219786e+00 -2.169033e+00
log_lik[52]     -2.809090e+00 -2.419580e+00 -2.258792e+00 -2.208433e+00
```

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log_lik[53]     -2.381479e+00 -2.025290e+00 -1.873544e+00 -1.829029e+00
log_lik[54]     -2.944449e+00 -2.485197e+00 -2.297615e+00 -2.245045e+00
log_lik[55]     -2.581954e+00 -2.128713e+00 -1.958272e+00 -1.904545e+00
log_lik[56]     -2.966537e+00 -2.571805e+00 -2.412585e+00 -2.369130e+00
log_lik[57]     -2.923946e+00 -2.451495e+00 -2.264543e+00 -2.208300e+00
log_lik[58]     -2.608601e+00 -2.223342e+00 -2.072471e+00 -2.027227e+00
log_lik[59]     -2.394627e+00 -2.030340e+00 -1.874485e+00 -1.829285e+00
log_lik[60]     -2.669267e+00 -2.211817e+00 -2.025758e+00 -1.969429e+00
log_lik[61]     -2.458619e+00 -2.093416e+00 -1.945389e+00 -1.904140e+00
log_lik[62]     -2.397674e+00 -2.033113e+00 -1.874282e+00 -1.829194e+00
log_lik[63]     -2.957919e+00 -2.532281e+00 -2.360584e+00 -2.310868e+00
log_lik[64]     -2.147055e+00 -1.799942e+00 -1.668156e+00 -1.633222e+00
log_lik[65]     -2.404670e+00 -2.036609e+00 -1.875234e+00 -1.829114e+00
log_lik[66]     -2.793419e+00 -2.374757e+00 -2.213081e+00 -2.168648e+00
log_lik[67]     -2.316299e+00 -1.944132e+00 -1.785055e+00 -1.740769e+00
log_lik[68]     -2.282953e+00 -1.923902e+00 -1.779377e+00 -1.740679e+00
log_lik[69]     -2.988558e+00 -2.560615e+00 -2.391588e+00 -2.340881e+00
log_lik[70]     -2.256058e+00 -1.920076e+00 -1.778854e+00 -1.740746e+00
log_lik[71]     -2.478930e+00 -2.099150e+00 -1.949875e+00 -1.904322e+00
log_lik[72]     -1.767998e+00 -1.463634e+00 -1.340914e+00 -1.307298e+00
log_lik[73]     -2.669752e+00 -2.241834e+00 -2.076196e+00 -2.027284e+00
log_lik[74]     -2.474222e+00 -2.108400e+00 -1.951397e+00 -1.904166e+00
log_lik[75]     -2.423695e+00 -2.036213e+00 -1.871444e+00 -1.829134e+00
log_lik[76]     -2.823792e+00 -2.383636e+00 -2.212318e+00 -2.168763e+00
log_lik[77]     -2.799471e+00 -2.406347e+00 -2.253220e+00 -2.208359e+00
log_lik[78]     -2.999655e+00 -2.561382e+00 -2.389142e+00 -2.340715e+00
log_lik[79]     -2.321796e+00 -1.945816e+00 -1.790541e+00 -1.740989e+00
log_lik[80]     -2.390544e+00 -1.958559e+00 -1.793287e+00 -1.740681e+00
log_lik[81]     -2.430892e+00 -2.047930e+00 -1.875637e+00 -1.829087e+00
log_lik[82]     -2.806632e+00 -2.406525e+00 -2.223623e+00 -2.168894e+00
log_lik[83]     -2.728060e+00 -2.299093e+00 -2.126631e+00 -2.079132e+00
log_lik[84]     -2.967490e+00 -2.541095e+00 -2.357777e+00 -2.310991e+00
log_lik[85]     -2.722220e+00 -2.289855e+00 -2.125231e+00 -2.079018e+00
log_lik[86]     -2.905188e+00 -2.512459e+00 -2.357930e+00 -2.310869e+00
log_lik[87]     -2.940954e+00 -2.511923e+00 -2.328161e+00 -2.279153e+00
log_lik[88]     -3.016994e+00 -2.579086e+00 -2.412243e+00 -2.369149e+00
log_lik[89]     -2.493306e+00 -2.065194e+00 -1.886065e+00 -1.829311e+00
log_lik[90]     -2.840997e+00 -2.401876e+00 -2.219107e+00 -2.168943e+00
log_lik[91]     -2.395642e+00 -2.022313e+00 -1.872554e+00 -1.829195e+00
log_lik[92]     -2.635956e+00 -2.185224e+00 -2.017777e+00 -1.969534e+00
log_lik[93]     -3.274283e+00 -2.873750e+00 -2.711949e+00 -2.670076e+00
log_lik[94]     -2.926329e+00 -2.500932e+00 -2.328825e+00 -2.278999e+00
log_lik[95]     -2.905804e+00 -2.457690e+00 -2.294214e+00 -2.244817e+00
```

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log_lik[96]     -3.027514e+00 -2.605505e+00 -2.421039e+00 -2.369278e+00
log_lik[97]     -3.112828e+00 -2.738184e+00 -2.580677e+00 -2.532586e+00
log_lik[98]     -2.865770e+00 -2.465055e+00 -2.298971e+00 -2.244957e+00
log_lik[99]     -1.828478e+00 -1.482664e+00 -1.345010e+00 -1.307206e+00
log_lik[100]    -3.756731e+00 -3.305449e+00 -3.119128e+00 -3.065714e+00
log_lik[101]    -2.858159e+00 -2.432317e+00 -2.259052e+00 -2.208269e+00
log_lik[102]    -2.880886e+00 -2.457853e+00 -2.291972e+00 -2.244857e+00
log_lik[103]    -2.413757e+00 -2.036547e+00 -1.879142e+00 -1.829340e+00
log_lik[104]    -3.074732e+00 -2.644469e+00 -2.472081e+00 -2.421487e+00
log_lik[105]    -2.559792e+00 -2.159877e+00 -2.012485e+00 -1.969464e+00
log_lik[106]    -2.793521e+00 -2.391157e+00 -2.218404e+00 -2.168864e+00
log_lik[107]    -2.737160e+00 -2.315094e+00 -2.130568e+00 -2.079045e+00
log_lik[108]    -1.999231e+00 -1.661744e+00 -1.533407e+00 -1.496353e+00
log_lik[109]    -2.717649e+00 -2.333551e+00 -2.175324e+00 -2.125947e+00
log_lik[110]    -2.011065e+00 -1.675538e+00 -1.538479e+00 -1.496261e+00
log_lik[111]    -2.751312e+00 -2.344852e+00 -2.174055e+00 -2.125965e+00
log_lik[112]    -2.888998e+00 -2.450094e+00 -2.261586e+00 -2.208259e+00
log_lik[113]    -2.736832e+00 -2.337908e+00 -2.177692e+00 -2.126061e+00
log_lik[114]    -2.859125e+00 -2.421119e+00 -2.254851e+00 -2.208291e+00
log_lik[115]    -2.677022e+00 -2.279668e+00 -2.124455e+00 -2.078942e+00
log_lik[116]    -2.281609e+00 -1.933984e+00 -1.781865e+00 -1.740717e+00
log_lik[117]    -2.984926e+00 -2.579187e+00 -2.417109e+00 -2.369144e+00
log_lik[118]    -2.703140e+00 -2.300383e+00 -2.126430e+00 -2.078949e+00
log_lik[119]    -3.170464e+00 -2.733785e+00 -2.548472e+00 -2.490895e+00
log_lik[120]    -2.286441e+00 -1.937712e+00 -1.783758e+00 -1.740692e+00
log_lik[121]    -2.599417e+00 -2.223602e+00 -2.069496e+00 -2.027194e+00
log_lik[122]    -1.925385e+00 -1.516528e+00 -1.350300e+00 -1.307323e+00
log_lik[123]    -2.751446e+00 -2.334764e+00 -2.173669e+00 -2.125966e+00
log_lik[124]    -2.605405e+00 -2.225530e+00 -2.070277e+00 -2.027234e+00
log_lik[125]    -2.769959e+00 -2.345208e+00 -2.172219e+00 -2.125862e+00
log_lik[126]    -2.432446e+00 -2.037172e+00 -1.875283e+00 -1.829204e+00
log_lik[127]    -2.711972e+00 -2.332207e+00 -2.166894e+00 -2.125822e+00
log_lik[128]    -2.306115e+00 -1.931837e+00 -1.784748e+00 -1.740878e+00
log_lik[129]    -3.071036e+00 -2.631087e+00 -2.447579e+00 -2.396104e+00
log_lik[130]    -2.923972e+00 -2.504520e+00 -2.330566e+00 -2.279020e+00
log_lik[131]    -2.139724e+00 -1.803037e+00 -1.670330e+00 -1.633216e+00
log_lik[132]    -2.591250e+00 -2.174454e+00 -2.019145e+00 -1.969614e+00
log_lik[133]    -2.675603e+00 -2.259479e+00 -2.079167e+00 -2.027430e+00
log_lik[134]    -2.431770e+00 -2.032783e+00 -1.878742e+00 -1.829165e+00
log_lik[135]    -2.138222e+00 -1.810855e+00 -1.674232e+00 -1.633224e+00
log_lik[136]    -2.166095e+00 -1.818856e+00 -1.673415e+00 -1.633262e+00
log_lik[137]    -1.812810e+00 -1.481192e+00 -1.343653e+00 -1.307224e+00
log_lik[138]    -2.795037e+00 -2.380968e+00 -2.213194e+00 -2.168778e+00
```

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log_lik[139]    -2.778260e+00 -2.381335e+00 -2.216432e+00 -2.168765e+00
log_lik[140]    -2.726684e+00 -2.335927e+00 -2.176423e+00 -2.125948e+00
log_lik[141]    -2.674612e+00 -2.247543e+00 -2.073759e+00 -2.027296e+00
log_lik[142]    -2.546265e+00 -2.113475e+00 -1.953982e+00 -1.904186e+00
log_lik[143]    -2.475220e+00 -2.106342e+00 -1.949649e+00 -1.904251e+00
log_lik[144]    -2.587140e+00 -2.183440e+00 -2.018500e+00 -1.969685e+00
log_lik[145]    -2.813996e+00 -2.384957e+00 -2.217703e+00 -2.168664e+00
log_lik[146]    -2.732698e+00 -2.328428e+00 -2.170840e+00 -2.125811e+00
log_lik[147]    -3.126420e+00 -2.704650e+00 -2.538586e+00 -2.490836e+00
log_lik[148]    -2.488504e+00 -2.108781e+00 -1.951460e+00 -1.904183e+00
log_lik[149]    -3.040258e+00 -2.552392e+00 -2.362305e+00 -2.310833e+00
log_lik[150]    -3.476724e+00 -3.045014e+00 -2.882565e+00 -2.835502e+00
log_lik[151]    -2.645049e+00 -2.257866e+00 -2.078835e+00 -2.027365e+00
log_lik[152]    -2.981748e+00 -2.592130e+00 -2.419939e+00 -2.369234e+00
log_lik[153]    -2.835039e+00 -2.407624e+00 -2.216135e+00 -2.168875e+00
log_lik[154]    -2.799213e+00 -2.424858e+00 -2.254651e+00 -2.208315e+00
log_lik[155]    -2.846529e+00 -2.441872e+00 -2.287686e+00 -2.244697e+00
log_lik[156]    -2.860629e+00 -2.453724e+00 -2.290845e+00 -2.244834e+00
log_lik[157]    -1.987509e+00 -1.666886e+00 -1.535086e+00 -1.496344e+00
log_lik[158]    -2.656886e+00 -2.243931e+00 -2.076157e+00 -2.027322e+00
log_lik[159]    -2.913860e+00 -2.495878e+00 -2.326799e+00 -2.278850e+00
log_lik[160]    -2.398283e+00 -2.021904e+00 -1.874510e+00 -1.829002e+00
log_lik[161]    -2.814072e+00 -2.400567e+00 -2.250112e+00 -2.208151e+00
log_lik[162]    -2.831433e+00 -2.421221e+00 -2.255887e+00 -2.208341e+00
log_lik[163]    -2.846316e+00 -2.390959e+00 -2.216052e+00 -2.168828e+00
log_lik[164]    -2.566623e+00 -2.181028e+00 -2.017104e+00 -1.969563e+00
log_lik[165]    -2.719098e+00 -2.333144e+00 -2.172247e+00 -2.125918e+00
log_lik[166]    -2.303800e+00 -1.939735e+00 -1.783371e+00 -1.740746e+00
log_lik[167]    -2.679569e+00 -2.253070e+00 -2.077700e+00 -2.027400e+00
log_lik[168]    -2.558263e+00 -2.179440e+00 -2.014685e+00 -1.969456e+00
log_lik[169]    -3.145722e+00 -2.691997e+00 -2.516229e+00 -2.468622e+00
log_lik[170]    -2.586783e+00 -2.230292e+00 -2.073729e+00 -2.027314e+00
log_lik[171]    -1.805263e+00 -1.468977e+00 -1.341611e+00 -1.307158e+00
log_lik[172]    -2.739068e+00 -2.300654e+00 -2.123734e+00 -2.078983e+00
log_lik[173]    -2.365574e+00 -2.006356e+00 -1.868970e+00 -1.829030e+00
log_lik[174]    -2.687538e+00 -2.291252e+00 -2.121600e+00 -2.079078e+00
log_lik[175]    -2.806090e+00 -2.385220e+00 -2.215754e+00 -2.168901e+00
log_lik[176]    -2.619413e+00 -2.237722e+00 -2.071692e+00 -2.027155e+00
log_lik[177]    -2.787775e+00 -2.358490e+00 -2.178285e+00 -2.126123e+00
log_lik[178]    -3.280180e+00 -2.858143e+00 -2.704238e+00 -2.654801e+00
log_lik[179]    -2.270285e+00 -1.917455e+00 -1.780550e+00 -1.740619e+00
log_lik[180]    -2.682867e+00 -2.321019e+00 -2.166992e+00 -2.125877e+00
log_lik[181]    -2.667438e+00 -2.254025e+00 -2.078390e+00 -2.027393e+00
```

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log_lik[182]    -2.727185e+00 -2.336149e+00 -2.175665e+00 -2.125972e+00
log_lik[183]    -2.729642e+00 -2.327075e+00 -2.171119e+00 -2.125917e+00
log_lik[184]    -2.021937e+00 -1.324687e+00 -8.427379e-01 -3.281233e-01
log_lik[185]    -2.681465e+00 -2.240813e+00 -2.073562e+00 -2.027108e+00
log_lik[186]    -2.002058e+00 -1.664741e+00 -1.533832e+00 -1.496245e+00
log_lik[187]    -2.725960e+00 -2.340448e+00 -2.173181e+00 -2.125912e+00
log_lik[188]    -2.743922e+00 -2.340195e+00 -2.170614e+00 -2.125954e+00
log_lik[189]    -2.811687e+00 -2.362086e+00 -2.181835e+00 -2.126154e+00
log_lik[190]    -2.292896e+00 -1.935045e+00 -1.783579e+00 -1.740800e+00
log_lik[191]    -2.106181e+00 -1.793995e+00 -1.669099e+00 -1.633151e+00
log_lik[192]    -2.595161e+00 -2.176547e+00 -2.012571e+00 -1.969567e+00
log_lik[193]    -2.608303e+00 -2.245725e+00 -2.082420e+00 -2.027456e+00
log_lik[194]    -3.275361e+00 -2.833493e+00 -2.666685e+00 -2.622744e+00
log_lik[195]    -3.937610e+00 -3.493765e+00 -3.318632e+00 -3.270426e+00
lp__             3.892650e+03  3.899242e+03  3.905478e+03  3.916744e+03
                     n_eff      Rhat
alpha[1]         6115.6215 1.0005225
alpha[2]         6826.1997 0.9995735
alpha[3]         2628.3513 1.0025278
alpha[4]         6860.3037 0.9993903
alpha[5]         4057.7112 1.0000396
alpha[6]         3297.7919 1.0007985
alpha[7]         1873.6097 1.0032787
alpha[8]         3157.4197 1.0017244
alpha[9]         7396.8699 0.9994906
alpha[10]        7266.5380 0.9993177
alpha[11]        8111.2971 0.9993879
alpha[12]        5952.8864 0.9999843
alpha[13]        7071.3494 0.9993265
alpha[14]        5333.8026 1.0003388
alpha[15]        7645.3365 0.9995947
alpha[16]        4667.8673 1.0000063
alpha[17]        6660.2166 0.9997205
alpha[18]        8335.9182 0.9992648
alpha[19]        2143.1547 1.0021314
alpha[20]        7741.5849 0.9990583
alpha[21]        4243.8738 0.9997188
alpha[22]        4574.9987 1.0000431
alpha[23]        4262.3163 0.9998911
alpha[24]        6650.7622 0.9998467
alpha[25]        2667.0932 1.0012678
alpha[26]        7480.9349 0.9993239
alpha[27]        6095.0834 0.9993907
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alpha[28]        4407.8080 1.0006178
alpha[29]        5642.3903 0.9995415
alpha[30]        3705.0173 1.0012744
alpha[31]        7704.7175 0.9994537
alpha[32]        6161.2598 0.9998965
alpha[33]        6988.7271 1.0008761
alpha[34]        8775.5282 0.9995532
alpha[35]        5381.5244 1.0001735
alpha[36]        2327.5162 1.0019109
alpha[37]        7982.9157 0.9993191
alpha[38]        5971.2119 0.9995749
alpha[39]        6094.0406 0.9999895
alpha[40]        4774.9110 1.0002337
alpha[41]        7753.5324 0.9994843
alpha[42]        7787.4999 0.9992482
alpha[43]        7765.7599 0.9997169
alpha[44]        8197.9094 0.9996130
alpha[45]        8712.5193 0.9994278
alpha[46]        3846.7096 1.0000007
alpha[47]        5683.6241 0.9998953
alpha[48]        7161.6995 0.9997412
alpha[49]        8404.6151 0.9997986
alpha[50]        7102.4196 0.9994558
alpha[51]        4018.1159 1.0015461
alpha[52]        4885.6333 0.9993232
alpha[53]        6786.0518 0.9993205
alpha[54]        6287.0610 1.0003850
alpha[55]        6202.2619 0.9998136
alpha[56]        5939.1893 0.9995939
alpha[57]        5603.7428 0.9998406
alpha[58]        3920.8968 0.9996949
alpha[59]        5719.3746 0.9998113
alpha[60]        6340.4127 0.9997612
alpha[61]        7516.4697 0.9994972
alpha[62]        7775.6431 0.9992241
alpha[63]        6624.8039 0.9993461
alpha[64]        7101.9577 0.9994266
alpha[65]        6361.7877 0.9995296
alpha[66]        6619.8775 0.9997958
alpha[67]        5592.8274 0.9995573
alpha[68]        7655.6710 0.9996231
alpha[69]        4634.5568 1.0002903
alpha[70]        6839.9545 0.9998621
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alpha[74]       5613.4392 0.9995884
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alpha[76]       6572.4176 0.9996699
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alpha[79]       7042.9283 0.9995296
alpha[80]       8134.8714 0.9996833
alpha[81]       6237.7704 0.9993646
alpha[82]       7928.2756 0.9996625
alpha[83]       7522.2395 0.9992010
alpha[84]       3447.4957 1.0001362
alpha[85]       5760.0526 1.0000273
alpha[86]       6726.0645 0.9992837
alpha[87]       7526.9377 0.9993146
alpha[88]       7642.4298 0.9995770
alpha[89]       6630.4313 0.9995497
alpha[90]       7646.0142 0.9992401
alpha[91]       6204.6378 1.0000460
alpha[92]       6354.3877 1.0004413
alpha[93]       2469.5457 1.0009898
alpha[94]       8011.7280 0.9993453
alpha[95]       7449.5579 1.0001569
alpha[96]       6333.8635 1.0002136
alpha[97]       4432.3619 0.9997991
alpha[98]       6815.8243 0.9994005
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alpha[102]      7929.7489 0.9994337
alpha[103]      7822.5619 0.9997331
alpha[104]      5414.6008 0.9999510
alpha[105]      8491.0686 0.9994429
alpha[106]      6739.0342 0.9995480
alpha[107]      5904.0228 0.9998586
alpha[108]      8379.7309 0.9995586
alpha[109]      7959.6911 1.0001280
alpha[110]      7517.9186 1.0001376
alpha[111]      5616.5077 0.9992665
alpha[112]      5782.0011 0.9999251
alpha[113]      6806.8116 1.0001225
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alpha[115]       8059.3159 1.0003401
alpha[116]       6264.7226 1.0001596
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alpha[118]       4812.9317 1.0008714
alpha[119]       5117.4198 0.9999612
alpha[120]       6511.9349 0.9995832
alpha[121]       6979.4422 0.9994970
alpha[122]       7012.1973 0.9993090
alpha[123]       7094.0110 0.9996219
alpha[124]       6528.9446 1.0000547
alpha[125]       7940.7058 0.9991753
alpha[126]       8072.6928 0.9991737
alpha[127]       5099.1319 1.0003455
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alpha[130]       8318.3320 0.9994711
alpha[131]       6434.9028 0.9991633
alpha[132]       7565.8192 0.9994141
alpha[133]       7151.9709 0.9995725
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alpha[136]       8085.9856 0.9992077
alpha[137]       6384.1807 0.9998816
alpha[138]       5265.1867 0.9994227
alpha[139]       6444.3519 0.9993538
alpha[140]       8497.3354 0.9994774
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alpha[142]       5902.3124 0.9996386
alpha[143]       7748.7148 0.9993585
alpha[144]       5466.2943 0.9999141
alpha[145]       4491.5186 1.0004699
alpha[146]       5265.9534 1.0001659
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alpha[149]       8077.0342 0.9994592
alpha[150]       5192.6466 0.9999741
alpha[151]       6588.1001 0.9997886
alpha[152]       4513.1911 1.0009802
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alpha[155]       5902.6948 0.9996142
alpha[156]       8132.0421 0.9995035
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alpha[165]       8484.9369 0.9993103
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alpha[167]       6645.0180 1.0004693
alpha[168]       7273.8232 0.9992756
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alpha[171]       7159.2044 1.0000235
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alpha[173]       9913.3014 0.9994004
alpha[174]       6209.6220 0.9996152
alpha[175]       4634.9595 0.9998585
alpha[176]       4962.0992 1.0002358
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alpha[181]       5825.9713 0.9997118
alpha[182]       5431.6015 0.9996132
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alpha[195]       1366.0729 1.0051453
beta              791.0267 1.0069205
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log_theta[2]     7883.6804 0.9993540
log_theta[3]     8013.4978 0.9998413
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log_theta[7]     9601.4965 0.9999003
log_theta[8]     9153.9265 0.9994999
log_theta[9]     8739.0966 0.9991880
log_theta[10]    7319.8045 0.9993541
log_theta[11]    8662.4229 0.9992514
log_theta[12]    9029.5067 0.9995318
log_theta[13]    7988.0694 0.9992263
log_theta[14]    8729.1043 0.9996641
log_theta[15]    8160.4968 0.9995901
log_theta[16]    7682.1816 0.9993089
log_theta[17]    8801.7601 0.9993606
log_theta[18]    8595.5679 0.9992693
log_theta[19]    8542.6988 0.9991997
log_theta[20]    8473.0208 0.9991098
log_theta[21]    9207.2210 1.0000163
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log_theta[30]    9947.0853 0.9991368
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log_theta[32]    6724.0260 0.9998237
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log_theta[35]    6394.0833 0.9995244
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log_theta[39]    7428.1947 0.9999003
log_theta[40]    7978.1997 0.9995970
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log_theta[42]    7809.8321 0.9992617
log_theta[43]    9933.1997 0.9993312
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log_theta[45]    8684.5284 0.9993835
log_theta[46]    8334.2420 1.0000647
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log_theta[49]    9667.9917 0.9993548
log_theta[50]    7596.1218 0.9993046
log_theta[51]    8229.4673 0.9996132
log_theta[52]    7987.7073 0.9991464
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log_theta[66]    8644.3270 0.9996385
log_theta[67]    7022.6035 0.9991058
log_theta[68]    7777.9127 0.9996893
log_theta[69]    8633.8131 0.9990839
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log_theta[73]    7626.6712 1.0000714
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log_theta[79]    7233.3074 0.9993705
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log_theta[92]    7826.2099 0.9996590
log_theta[93]    9285.6568 0.9997003
log_theta[94]    8520.1728 0.9992078
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log_theta[103]   8007.1973 0.9997491
log_theta[104]   9229.7894 0.9993823
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log_theta[106]   7782.8473 0.9992981
log_theta[107]   7994.9248 0.9995485
log_theta[108]   8409.8732 0.9995064
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log_theta[141]   9068.2521 0.9991572
log_theta[142]   7239.3216 0.9993864
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log_lambda[150]  8934.7897 0.9993796
log_lambda[151]  7741.3917 0.9997140
log_lambda[152]  8517.6199 0.9995786
```

```
log_lambda[153]  8254.1982 0.9998259
log_lambda[154]  7588.9674 0.9995214
log_lambda[155]  6936.1801 0.9992185
log_lambda[156]  8655.4605 0.9996022
log_lambda[157]  7396.7168 1.0000247
log_lambda[158]  6838.1949 0.9996783
log_lambda[159]  7815.7012 0.9999670
log_lambda[160]  7826.7634 0.9994105
log_lambda[161]  8687.2902 0.9992376
log_lambda[162]  8940.7222 0.9999741
log_lambda[163]  7706.6834 0.9995290
log_lambda[164]  7176.3581 0.9995192
log_lambda[165]  9110.3897 0.9992152
log_lambda[166]  8133.4738 0.9994986
log_lambda[167]  6657.0769 1.0004571
log_lambda[168]  7491.3862 0.9992820
log_lambda[169]  8310.2538 0.9992866
log_lambda[170]  9368.8910 0.9993613
log_lambda[171]  7160.5044 1.0000241
log_lambda[172]  7109.9873 0.9994166
log_lambda[173] 10172.4414 0.9992628
log_lambda[174]  8521.0868 0.9993739
log_lambda[175]  7258.1780 0.9993669
log_lambda[176]  7627.5564 0.9996470
log_lambda[177]  8714.5237 0.9992955
log_lambda[178]  8667.7477 0.9995288
log_lambda[179]  6744.4205 0.9993305
log_lambda[180]  8817.2517 0.9994213
log_lambda[181]  7664.3196 1.0000614
log_lambda[182]  7765.6413 0.9992213
log_lambda[183]  8285.4021 0.9997854
log_lambda[184]  6300.7474 0.9996594
log_lambda[185]  8380.4715 0.9992540
log_lambda[186]  7330.8605 0.9996076
log_lambda[187]  7489.1831 0.9995815
log_lambda[188]  8947.0646 0.9992252
log_lambda[189]  7105.4518 0.9996722
log_lambda[190]  7327.5207 0.9991913
log_lambda[191]  7589.4106 0.9993304
log_lambda[192]  9682.5355 0.9995384
log_lambda[193]  8223.2287 0.9994080
log_lambda[194]  8864.7361 0.9991420
log_lambda[195]  8285.7770 0.9996436
```

```
log_lik[1]        833.2916 1.0055032
log_lik[2]       1585.9461 1.0009971
log_lik[3]       1377.0579 1.0056578
log_lik[4]       1376.1744 1.0031499
log_lik[5]       1283.9044 1.0008461
log_lik[6]       1427.9445 1.0002997
log_lik[7]       1602.0858 0.9994220
log_lik[8]       1566.7203 1.0014991
log_lik[9]       1658.9676 1.0000857
log_lik[10]      1756.4974 0.9998547
log_lik[11]      1352.3817 1.0022037
log_lik[12]      1692.1225 1.0000941
log_lik[13]      1349.2289 1.0010637
log_lik[14]      1618.9679 1.0025283
log_lik[15]      1327.3424 1.0002452
log_lik[16]      1580.5798 1.0015274
log_lik[17]      1772.7140 0.9999824
log_lik[18]      1339.6635 1.0007915
log_lik[19]      1142.8889 1.0024222
log_lik[20]      1629.1737 1.0006957
log_lik[21]      1792.4311 1.0004794
log_lik[22]      1510.2967 1.0011123
log_lik[23]      1255.0605 1.0026071
log_lik[24]      1350.9006 0.9994291
log_lik[25]      1480.8200 1.0002485
log_lik[26]      1480.3493 1.0009674
log_lik[27]      1620.3402 0.9995416
log_lik[28]      1638.7071 1.0023580
log_lik[29]      1509.8474 0.9998461
log_lik[30]      1481.7108 1.0007781
log_lik[31]      1548.1953 1.0002013
log_lik[32]      1627.1691 0.9999074
log_lik[33]      1480.9571 1.0025363
log_lik[34]      1314.2668 1.0036302
log_lik[35]      1656.2356 1.0023315
log_lik[36]      1334.8722 1.0004964
log_lik[37]      1553.1258 1.0046159
log_lik[38]      1354.1643 1.0043428
log_lik[39]      1488.1191 1.0012073
log_lik[40]      1220.7130 1.0019597
log_lik[41]      1695.0573 1.0010341
log_lik[42]      1532.8018 1.0019396
log_lik[43]      1394.4184 1.0024348
```

```
log_lik[44]      1403.7219 1.0013640
log_lik[45]      1892.2831 1.0011894
log_lik[46]      1345.4939 1.0018633
log_lik[47]      1524.7067 1.0027351
log_lik[48]      1587.4165 1.0045950
log_lik[49]      1397.2783 1.0004383
log_lik[50]      1352.9502 1.0020736
log_lik[51]      1349.3799 1.0019449
log_lik[52]      1530.4120 1.0007128
log_lik[53]      1356.6943 1.0005000
log_lik[54]      1739.2033 1.0011934
log_lik[55]      1767.5577 1.0000804
log_lik[56]      1413.3601 1.0004909
log_lik[57]      1479.0502 1.0007457
log_lik[58]      1250.0338 1.0044840
log_lik[59]      1455.7795 1.0024353
log_lik[60]      1504.5849 1.0030714
log_lik[61]      1404.9642 1.0002819
log_lik[62]      1185.9680 1.0006087
log_lik[63]      1293.0901 1.0027961
log_lik[64]      1530.0633 1.0015371
log_lik[65]      1600.5538 1.0002655
log_lik[66]      1454.7428 1.0013904
log_lik[67]      1332.3504 0.9996914
log_lik[68]      1064.4011 1.0046813
log_lik[69]      1535.1124 1.0006446
log_lik[70]      1371.9111 1.0017717
log_lik[71]      1362.6809 1.0022279
log_lik[72]      1800.5762 1.0015753
log_lik[73]      1405.7478 1.0035445
log_lik[74]      1630.6582 1.0008438
log_lik[75]      1405.3902 1.0020522
log_lik[76]      1599.1501 1.0010983
log_lik[77]      1321.5889 1.0022688
log_lik[78]      1698.3244 0.9997704
log_lik[79]      1843.8098 1.0002922
log_lik[80]      1567.3101 1.0004156
log_lik[81]      1383.0466 1.0021045
log_lik[82]      1432.2114 1.0017700
log_lik[83]      1420.0794 0.9998506
log_lik[84]      1759.9568 1.0012314
log_lik[85]      1531.7260 1.0022760
log_lik[86]      1551.9048 1.0026003
```

```
log_lik[87]      1062.1757 1.0008356
log_lik[88]      1223.5296 1.0026834
log_lik[89]      1957.8297 1.0005138
log_lik[90]      1559.3076 1.0007600
log_lik[91]      1675.7659 1.0054954
log_lik[92]      1456.7567 1.0023527
log_lik[93]      1363.8274 1.0017929
log_lik[94]      1428.1207 1.0022577
log_lik[95]      1758.7408 1.0007176
log_lik[96]      1395.2058 1.0016631
log_lik[97]      1632.6632 1.0005460
log_lik[98]      1434.2384 1.0000295
log_lik[99]      1915.2703 1.0025109
log_lik[100]     1595.1710 1.0008558
log_lik[101]     1444.4598 1.0000997
log_lik[102]     1325.1868 1.0007485
log_lik[103]     1489.1757 1.0010269
log_lik[104]     1580.8694 1.0006572
log_lik[105]     1324.1492 1.0006028
log_lik[106]     1532.3330 1.0007783
log_lik[107]     1516.5217 1.0013063
log_lik[108]     1373.5024 1.0016090
log_lik[109]     1754.9273 1.0030747
log_lik[110]     1590.2206 0.9999290
log_lik[111]     1508.4864 1.0017814
log_lik[112]     1432.1228 1.0020224
log_lik[113]     1336.8623 1.0019545
log_lik[114]     1271.5597 1.0012096
log_lik[115]     1432.7520 1.0014636
log_lik[116]     1332.5885 1.0022310
log_lik[117]     1605.8388 1.0019574
log_lik[118]     1809.7059 1.0000953
log_lik[119]     1256.8218 1.0045277
log_lik[120]     1559.8327 0.9997329
log_lik[121]     1380.0405 1.0012450
log_lik[122]     2803.7381 1.0000846
log_lik[123]     1309.0201 1.0004601
log_lik[124]     1320.2169 1.0026639
log_lik[125]     1321.6080 1.0056483
log_lik[126]     1584.3265 0.9994122
log_lik[127]     1542.9353 1.0005196
log_lik[128]     1618.6154 1.0019075
log_lik[129]     1555.2937 1.0038360
```

```
log_lik[130]     1421.9818 1.0020873
log_lik[131]     1523.6795 1.0020051
log_lik[132]     1221.7503 1.0029674
log_lik[133]     1288.1158 1.0041052
log_lik[134]     1383.7398 1.0023543
log_lik[135]     1446.8438 1.0009004
log_lik[136]     1476.9923 1.0001194
log_lik[137]     2003.6856 1.0009279
log_lik[138]     1598.6679 1.0005839
log_lik[139]     1466.0917 1.0038771
log_lik[140]     1646.4327 1.0009994
log_lik[141]     1337.8905 1.0012178
log_lik[142]     1096.9008 1.0014461
log_lik[143]     1667.0651 1.0017842
log_lik[144]     1291.3662 1.0024728
log_lik[145]     1478.0882 1.0002528
log_lik[146]     1538.9481 1.0006774
log_lik[147]     1109.3706 1.0036357
log_lik[148]     1479.7989 0.9997879
log_lik[149]     1707.7508 1.0010641
log_lik[150]     1539.5495 1.0031257
log_lik[151]     1431.9283 1.0008558
log_lik[152]     1205.2327 1.0033984
log_lik[153]     1738.1227 1.0014097
log_lik[154]     1498.7548 1.0039270
log_lik[155]     1534.0190 1.0007415
log_lik[156]     1419.0703 1.0028473
log_lik[157]     1596.5571 1.0014348
log_lik[158]     1255.6565 1.0021047
log_lik[159]     1171.4503 1.0045214
log_lik[160]     1355.8095 1.0032237
log_lik[161]     1506.1918 1.0055055
log_lik[162]     1314.2149 1.0053597
log_lik[163]     1113.6469 1.0015780
log_lik[164]     1355.4935 1.0003980
log_lik[165]     1483.9056 1.0010507
log_lik[166]     1538.0358 1.0031116
log_lik[167]     1670.2575 1.0022350
log_lik[168]     1292.8579 1.0015557
log_lik[169]     1265.5011 1.0005145
log_lik[170]     1276.2182 1.0031224
log_lik[171]     1982.8586 0.9996970
log_lik[172]     1209.5505 1.0052817
```

```
log_lik[173]     1746.4670 1.0005616
log_lik[174]     1528.7792 1.0037956
log_lik[175]     1585.7647 0.9999887
log_lik[176]     1420.2715 1.0023289
log_lik[177]     1627.8506 1.0013264
log_lik[178]     1438.6864 1.0017155
log_lik[179]     1508.0067 1.0020426
log_lik[180]     1524.8565 1.0006768
log_lik[181]     1148.8615 1.0016585
log_lik[182]     1502.4420 1.0006968
log_lik[183]     1438.8208 1.0046299
log_lik[184]     5455.9931 0.9996190
log_lik[185]     1510.0005 1.0012303
log_lik[186]     1623.9661 1.0003793
log_lik[187]     1483.1323 1.0034219
log_lik[188]     1391.0996 1.0005766
log_lik[189]     1279.9956 1.0013213
log_lik[190]     1602.9765 1.0016495
log_lik[191]     1447.1833 1.0026003
log_lik[192]     1159.0300 1.0021107
log_lik[193]     1440.7837 1.0036239
log_lik[194]     1432.3219 1.0036919
log_lik[195]     1750.3219 1.0000077
lp__             1333.7660 1.0021245
```

```r
print(beta_2)
```

```
      mean      se_mean           sd         2.5%          25%          50%
1.46253306   0.02126076   0.59796314   0.30769247   1.05562167   1.46955138
       75%        97.5%        n_eff         Rhat
1.86330892   2.65114046 791.02672407   1.00692050
```

```r
stan_data <- list(N = length(observe.i),
                  log_y = log(expect.i),
                  x = aff.i - mean(aff.i),
                  y = observe.i)

model3 <- stan(data = stan_data,
               file = "model3.stan",
               iter = 2000,
               seed = 2201)
```

```
Running /Library/Frameworks/R.framework/Resources/bin/R CMD SHLIB foo.c
using C compiler: ‘Apple clang version 15.0.0 (clang-1500.3.9.4)’
using SDK: ‘MacOSX14.4.sdk’
clang -arch arm64 -I"/Library/Frameworks/R.framework/Resources/include" -DNDEBUG   -I"/Libra
In file included from <built-in>:1:
In file included from /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/St
In file included from /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/Rc
In file included from /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/Rc
/Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/library/RcppEigen/include/Eigen/
#include <cmath>
         ^~~~~~~
1 error generated.
make: *** [foo.o] Error 1

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 1).
Chain 1:
Chain 1: Gradient evaluation took 3.9e-05 seconds
Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 0.39 seconds.
Chain 1: Adjust your expectations accordingly!
Chain 1:
Chain 1:
Chain 1: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 1: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 1: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 1: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 1: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 1: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 1: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 1: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 1: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 1: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 1: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 1: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 1:
Chain 1:  Elapsed Time: 0.162 seconds (Warm-up)
Chain 1:                0.143 seconds (Sampling)
Chain 1:                0.305 seconds (Total)
Chain 1:

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 2).
Chain 2:
Chain 2: Gradient evaluation took 1e-05 seconds
Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 0.1 seconds.
```

```
Chain 2: Adjust your expectations accordingly!
Chain 2:
Chain 2:
Chain 2: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 2: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 2: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 2: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 2: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 2: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 2: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 2: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 2: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 2: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 2: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 2: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 2:
Chain 2:  Elapsed Time: 0.157 seconds (Warm-up)
Chain 2:                0.143 seconds (Sampling)
Chain 2:                0.3 seconds (Total)
Chain 2:

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 3).
Chain 3:
Chain 3: Gradient evaluation took 8e-06 seconds
Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 0.08 seconds.
Chain 3: Adjust your expectations accordingly!
Chain 3:
Chain 3:
Chain 3: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 3: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 3: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 3: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 3: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 3: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 3: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 3: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 3: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 3: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 3: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 3: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 3:
Chain 3:  Elapsed Time: 0.161 seconds (Warm-up)
Chain 3:                0.142 seconds (Sampling)
```

```
Chain 3:                0.303 seconds (Total)
Chain 3:

SAMPLING FOR MODEL 'anon_model' NOW (CHAIN 4).
Chain 4:
Chain 4: Gradient evaluation took 8e-06 seconds
Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 0.08 seconds.
Chain 4: Adjust your expectations accordingly!
Chain 4:
Chain 4:
Chain 4: Iteration:    1 / 2000 [  0%]  (Warmup)
Chain 4: Iteration:  200 / 2000 [ 10%]  (Warmup)
Chain 4: Iteration:  400 / 2000 [ 20%]  (Warmup)
Chain 4: Iteration:  600 / 2000 [ 30%]  (Warmup)
Chain 4: Iteration:  800 / 2000 [ 40%]  (Warmup)
Chain 4: Iteration: 1000 / 2000 [ 50%]  (Warmup)
Chain 4: Iteration: 1001 / 2000 [ 50%]  (Sampling)
Chain 4: Iteration: 1200 / 2000 [ 60%]  (Sampling)
Chain 4: Iteration: 1400 / 2000 [ 70%]  (Sampling)
Chain 4: Iteration: 1600 / 2000 [ 80%]  (Sampling)
Chain 4: Iteration: 1800 / 2000 [ 90%]  (Sampling)
Chain 4: Iteration: 2000 / 2000 [100%]  (Sampling)
Chain 4:
Chain 4:  Elapsed Time: 0.156 seconds (Warm-up)
Chain 4:                0.143 seconds (Sampling)
Chain 4:                0.299 seconds (Total)
Chain 4:
```

```r
summary_model3 <- summary(model3)

alpha_3 <- summary_model3$summary
estimators_3 <- summary_model3$summary[c("beta", "mu", "sigma"), ]

print(head(alpha_3))
```

```
              mean     se_mean        sd        2.5%         25%        50%
alpha[1] -0.1385934 0.003042096 0.2796644 -0.69442583 -0.32925214 -0.1337076
alpha[2]  0.2124245 0.002158803 0.2371088 -0.26035217  0.05660169  0.2168257
alpha[3]  0.3357163 0.002374658 0.2188227 -0.09297511  0.18277889  0.3390676
alpha[4] -0.1443971 0.002934427 0.2758171 -0.69320150 -0.32638105 -0.1375489
alpha[5]  0.3396291 0.002753245 0.2613848 -0.18920670  0.16923176  0.3467642
```

```
alpha[6] -0.6051224 0.002291327 0.1967572 -1.02195914 -0.73325457 -0.5977058
                75%      97.5%     n_eff      Rhat
alpha[1]  0.06257940  0.3767483  8451.392 0.9996872
alpha[2]  0.37423774  0.6610220 12063.398 0.9994704
alpha[3]  0.48849752  0.7515515  8491.461 0.9991186
alpha[4]  0.04470086  0.3767104  8834.786 0.9991822
alpha[5]  0.51774294  0.8367506  9013.034 0.9994259
alpha[6] -0.46954709 -0.2319029  7373.732 0.9995916
```

```r
print(estimators_3)
```

```
            mean      se_mean         sd       2.5%        25%        50%
beta  1.96829361 0.0064401476 0.33666527 1.29950978 1.74472025 1.97153371
mu    0.08614765 0.0005185326 0.03682725 0.01472093 0.06075512 0.08586837
sigma 0.38682689 0.0006643072 0.03114177 0.32826916 0.36549217 0.38641067
            75%     97.5%    n_eff      Rhat
beta  2.1986713 2.6238889 2732.782 0.9995994
mu    0.1105687 0.1581226 5044.132 0.9996093
sigma 0.4074923 0.4495765 2197.601 1.0014762
```

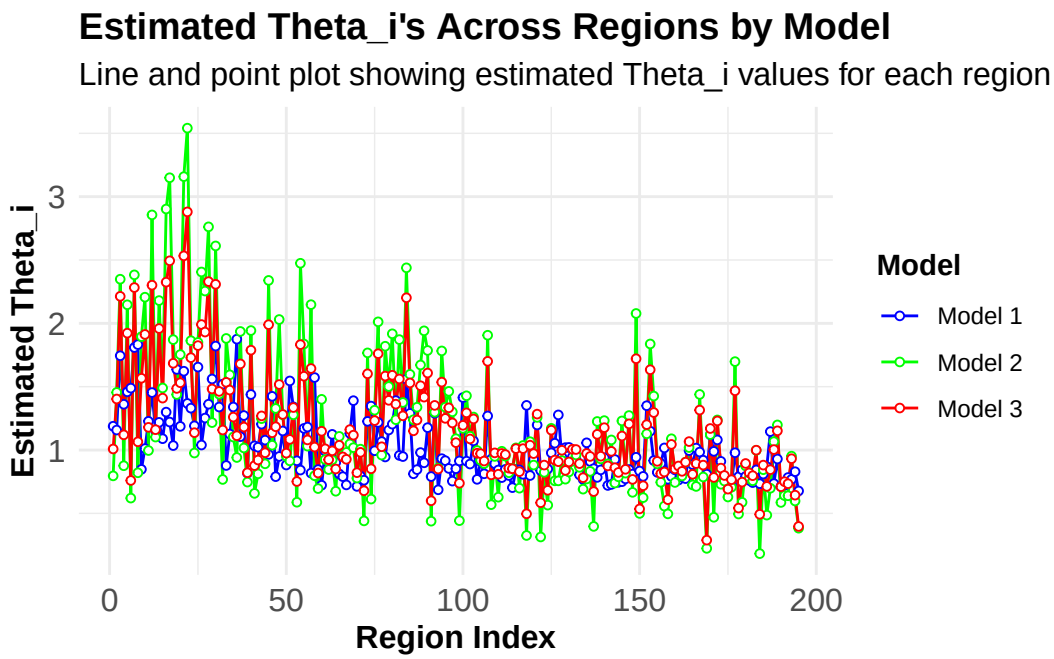
### Question 3

Make two plots (appropriately labeled and described) that illustrate the differences in estimated $\theta_i$'s across regions and the differences in $\theta$s across models.

## plot 1 differences in estimated $\theta_i$:

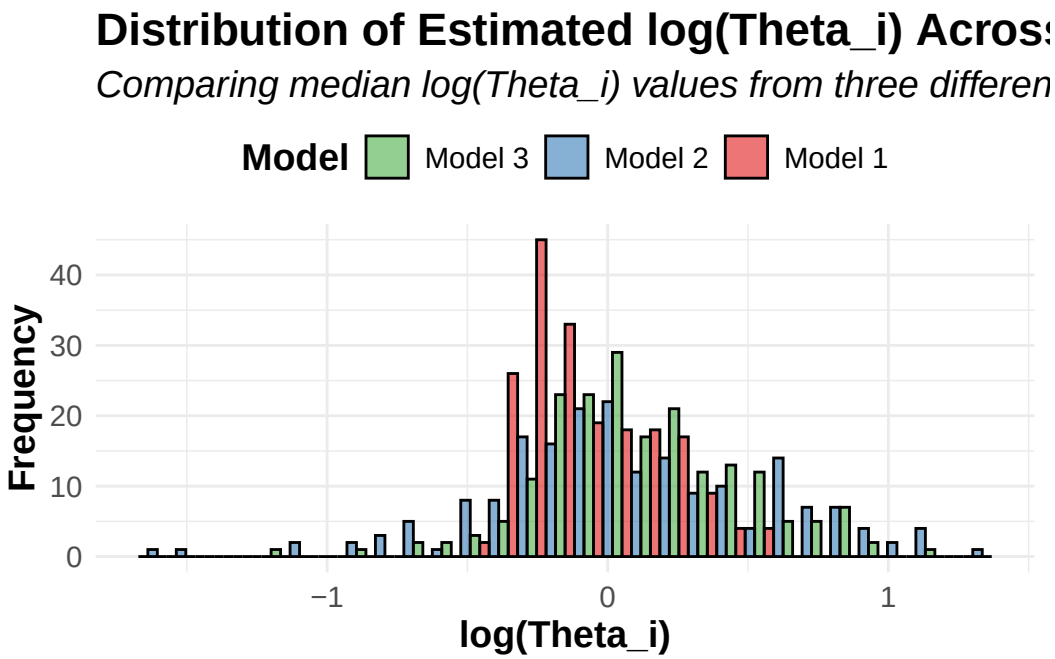
```r
input <- aff.i - mean(aff.i)
alpha_1 <- summary_model1$summary[c("alpha"), "mean"]
beta_1 <- summary_model1$summary[c("beta"), "mean"]
theta_1 <- exp(alpha_1 + beta_1 * input)

alpha_2 <- summary_model2$summary[,"mean"]
beta_2 <- summary_model2$summary[c("beta"), "mean"]
theta_2 <- exp(alpha_2 + beta_2 * input)

alpha_3 <- summary_model3$summary[, "mean"]
beta_3 <- summary_model3$summary[c("beta"), "mean"]
theta_3 <- exp(alpha_3 + beta_3 * input)
```

```r
library(ggplot2)

min_length <- min(length(theta_1), length(theta_2), length(theta_3))

theta_1 <- theta_1[1:min_length]
theta_2 <- theta_2[1:min_length]
theta_3 <- theta_3[1:min_length]

models <- c(rep("Model 1", min_length), rep("Model 2", min_length), rep("Model 3", min_len
regions <- rep(1:min_length, 3)

plot_data <- data.frame(theta_i = c(theta_1, theta_2, theta_3), model = models, region = r

ggplot(plot_data, aes(x = region, y = theta_i, color = model, group = model)) +
  geom_line() +
  geom_point(size = 1.2, shape = 21, fill = "white") +
  scale_color_manual(values = c("Model 1" = "blue", "Model 2" = "green", "Model 3" = "red"
  labs(title = "Estimated Theta_i's Across Regions by Model",
       subtitle = "Line and point plot showing estimated Theta_i values for each region ac
       x = "Region Index",
       y = "Estimated Theta_i",
       color = "Model") +
  theme_minimal() +
  theme(plot.title = element_text(face = "bold", size = 14),
        plot.subtitle = element_text(size = 12),
        legend.title = element_text(face = "bold"),
        legend.position = "right",
        axis.text = element_text(size = 12),
        axis.title = element_text(size = 12, face = "bold"))
```




```
library(tidybayes)
library(dplyr)
library(ggplot2)

theta_results1 <- model1 %>%
  gather_draws(log_theta[i]) %>%
  median_qi() %>%
  rename(theta_median1 = .value,
         theta_lower1 = .lower,
         theta_upper1 = .upper) %>%
  select(i, theta_median1: theta_upper1)

theta_results2 <- model2 %>%
  gather_draws(log_theta[i]) %>%
  median_qi() %>%
  rename(theta_median2 = .value,
         theta_lower2 = .lower,
         theta_upper2 = .upper) %>%
  select(i, theta_median2: theta_upper2)

theta_results3 <- model3 %>%
```

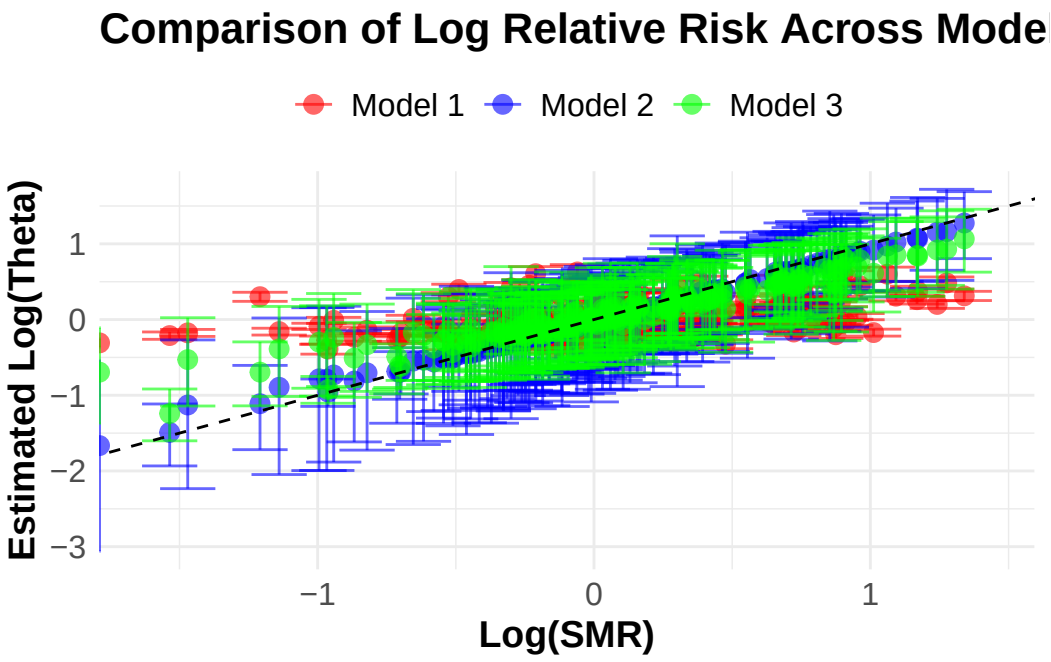
```r
  gather_draws(log_theta[i]) %>%
  median_qi() %>%
  rename(theta_median3 = .value,
         theta_lower3 = .lower,
         theta_upper3 = .upper) %>%
  select(i, theta_median3: theta_upper3)

all_model_results <- theta_results1 %>%
  left_join(theta_results2, by = "i") %>%
  left_join(theta_results3, by = "i")

all_model_results %>%
  select(theta_median1, theta_median2, theta_median3) %>%
  pivot_longer(cols = everything(), names_to = "model", values_to = "log_theta") %>%
  mutate(model = fct_recode(model, "Model 1" = "theta_median1", "Model 2" = "theta_median2
  ggplot(aes(x = log_theta, fill = model)) +
  geom_histogram(position = "dodge", bins = 30, alpha = 0.6, color = "black") +
  scale_fill_brewer(palette = "Set1") +
  labs(title = "Distribution of Estimated log(Theta_i) Across Models",
       subtitle = "Comparing median log(Theta_i) values from three different models",
       x = "log(Theta_i)",
       y = "Frequency",
       fill = "Model") +
  theme_minimal() +
  theme(text = element_text(size = 14),
        plot.title = element_text(face = "bold"),
        plot.subtitle = element_text(face = "italic"),
        legend.title = element_text(face = "bold"),
        legend.position = "top",
        axis.title = element_text(face = "bold")) +
  guides(fill = guide_legend(reverse = TRUE))
```




Well this plot tells a lot of stories, we see that the the distribution of model 2's $\theta_i$ has the largest spread and thus it has the highest standard deviation. It seems that all three model's $\theta_i$ centered around 0, and model 3's $\theta_i$ seems to be better distributed than model 1 and model 2.

```
library(ggplot2)

all_model_results %>%
  mutate(deaths = observe.i) %>%
  mutate(log_smr = log(observe.i / expect.i)) %>%
  ggplot() +
  geom_point(aes(x = log_smr, y = theta_median1, color = "Model 1"), size = 3, alpha = 0.6
  geom_errorbar(aes(x = log_smr, ymin = theta_lower1, ymax = theta_upper1, color = "Model
  geom_point(aes(x = log_smr, y = theta_median2, color = "Model 2"), size = 3, alpha = 0.6
  geom_errorbar(aes(x = log_smr, ymin = theta_lower2, ymax = theta_upper2, color = "Model
  geom_point(aes(x = log_smr, y = theta_median3, color = "Model 3"), size = 3, alpha = 0.6
  geom_errorbar(aes(x = log_smr, ymin = theta_lower3, ymax = theta_upper3, color = "Model
  geom_abline(slope = 1, intercept = 0, linetype = "dashed", color = "black") +
  labs(
    title = "Comparison of Log Relative Risk Across Models",
    x = "Log(SMR)",
    y = "Estimated Log(Theta)",
```

```
    color = "Model",
    size = "Number of Deaths"
  ) +
  scale_color_manual(values = c("Model 1" = "red", "Model 2" = "blue", "Model 3" = "green"
  theme_minimal() +
  theme(
    legend.position = "top",
    legend.title = element_blank(),
    legend.text = element_text(size = 12),
    axis.title = element_text(size = 14, face = "bold"),
    plot.title = element_text(size = 16, face = "bold"),
    plot.subtitle = element_text(size = 14, face = "italic"),
    axis.text = element_text(size = 12)
  )
```




From the above result, we can see that Model 3 captures the general trend better than model 1 and model 2 (model 2 has more uncertainty than model 3 as well).

### Question 4

Using tool of your choice, decide which model is the best, and justify your choice.

```r
library(rstan)
library(loo)
log_lik_1 <- rstan::extract(model1)[["log_lik"]]
loo_statistics_model1 <- loo::loo(log_lik_1, save_psis = TRUE)

log_lik_2 <- rstan::extract(model2)[["log_lik"]]
loo_statistics_model2 <- loo::loo(log_lik_2, save_psis = TRUE)

log_lik_3 <- rstan::extract(model3)[["log_lik"]]
loo_statistics_model3 <- loo::loo(log_lik_3, save_psis = TRUE)
loo_compare(loo_statistics_model1,loo_statistics_model2,loo_statistics_model3)
```

```
       elpd_diff se_diff
model3    0.0       0.0
model2  -23.3       8.0
model1 -151.3      45.4
```

Well, based on the above elpd result, we see that model 3 has the largest elpd result and thus this is the best model with the highest predictive performance.