

cm014 Worksheet: The Model-Fitting Paradigm in R

```
suppressPackageStartupMessages(library(tidyverse))
library(gapminder)
library(broom)
```

So you want to fit a model to your data. How can you achieve this with R?

Topics:

1. What *is* model-fitting?
2. How do we fit a model in R?
3. How can we obtain tidy results from the model output?

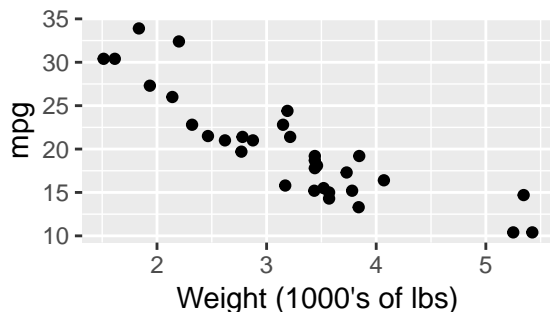
What is Model-Fitting?

When variables are not independent, then we can gain information about one variable if we know something about the other.

Examples: Use the scatterplot below:

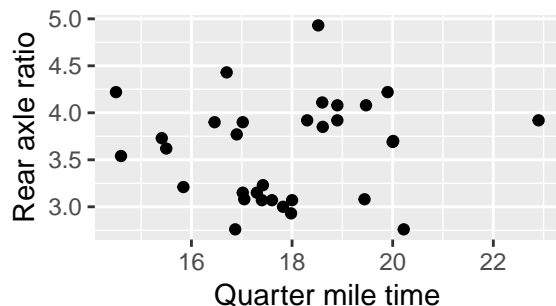
1. A car weighs 4000 lbs. What can we say about its mpg?
2. A car weighs less than 3000 lbs. What can we say about its mpg?

```
library(tidyverse)
ggplot(mtcars, aes(wt, mpg)) +
  geom_point() +
  labs(x = "Weight (1000's of lbs)")
```



Example: What can we say about rear axle ratio if we know something about quarter mile time?

```
ggplot(mtcars, aes(qsec, drat)) +
  geom_point() +
  labs(x = "Quarter mile time",
       y = "Rear axle ratio")
```



If EDA isn't enough, we can answer these questions by fitting a model: a curve that predicts Y given X. Aka, a **regression curve** or a **machine learning model**.

(There are more comprehensive models too, such as modelling entire distributions, but that's not what we're doing here)

There are typically two goals of fitting a model:

1. Make predictions.
2. Interpret variable relationships.

Fitting a model in R

Model fitting methods tend to use a common format in R:

```
method(formula, data, options)
```

They also tend to have a common output: a special *list*.

Method:

A function such as:

- Linear Regression: `lm`
- Generalized Linear Regression: `glm`
- Local regression: `loess`
- Quantile regression: `quantreg::rq`
- ...

Formula:

In R, takes the form `y ~ x1 + x2 + ... + xp` (use column names in your data frame).

Data: The data frame.

Options: Specific to the method.

Exercise:

1. Fit a linear regression model to life expectancy ("Y") from log(GDP per capita) ("X") by filling in the formula. Notice what appears as the output.
2. On a new line, use the `unclass` function to uncover the object's true nature: a list. Note: it might be easier to use the `names` function to see what components are included in the list.

```
(my_lm <- lm(lifeExp ~ log(gdpPercap), data=gapminder))
```

```
##
## Call:
## lm(formula = lifeExp ~ log(gdpPercap), data = gapminder)
##
## Coefficients:
##      (Intercept)      log(gdpPercap)
##          -9.101           8.405
```

```
unclass(my_lm)
```

```
## $coefficients
##      (Intercept)      log(gdpPercap)
##          -9.100889           8.405085
##
## $residuals
##           1           2           3           4           5
```

##	-1.806406e+01	-1.696812e+01	-1.562700e+01	-1.343579e+01	-1.034035e+01
##	6	7	8	9	10
##	-8.498661e+00	-8.918503e+00	-6.795054e+00	-3.656093e+00	-3.383894e+00
##	11	12	13	14	15
##	-4.147522e+00	-4.914964e+00	2.314653e+00	4.740780e+00	8.812978e+00
##	16	17	18	19	20
##	8.726919e+00	8.661483e+00	9.362154e+00	1.062247e+01	1.195599e+01
##	21	22	23	24	25
##	1.492874e+01	1.423250e+01	1.385729e+01	1.249241e+01	-1.341067e+01
##	26	27	28	29	30
##	-1.254738e+01	-8.527017e+00	-7.451293e+00	-6.468623e+00	-4.320887e+00
##	31	32	33	34	35
##	-2.286477e+00	2.238386e+00	5.218220e+00	7.013007e+00	8.036389e+00
##	36	37	38	39	40
##	7.974509e+00	-2.952331e+01	-2.824275e+01	-2.715889e+01	-2.733767e+01
##	41	42	43	44	45
##	-2.531901e+01	-1.873450e+01	-1.754120e+01	-1.651690e+01	-1.643307e+01
##	46	47	48	49	50
##	-1.491310e+01	-1.652985e+01	-1.940788e+01	-1.409110e+00	-7.422627e-01
##	51	52	53	54	55
##	-3.313150e-01	-8.587146e-01	-7.661315e-01	1.020343e-01	2.516724e+00
##	56	57	58	59	60
##	3.217323e+00	4.157554e+00	4.186143e+00	7.103900e+00	4.945867e+00
##	61	62	63	64	65
##	7.739812e-01	1.254667e+00	9.339776e-01	-3.509572e-01	-7.376194e-01
##	66	67	68	69	70
##	8.217680e-02	8.239488e-01	1.422702e+00	2.092714e+00	2.169473e+00
##	71	72	73	74	75
##	2.632754e+00	2.529316e+00	2.590866e+00	2.010580e-01	6.187708e-01
##	76	77	78	79	80
##	-2.703749e-01	-1.973794e+00	-1.862793e+00	-1.604494e+00	-6.211489e-01
##	81	82	83	84	85
##	-6.342399e-01	2.204568e-01	7.818357e-01	7.203570e-01	-1.726134e+01
##	86	87	88	89	90
##	-1.575419e+01	-1.343395e+01	-1.168760e+01	-1.007772e+01	-8.263762e+00
##	91	92	93	94	95
##	-4.748531e+00	-2.744399e+00	-1.122365e+00	-3.355990e-01	-6.646732e-01
##	96	97	98	99	100
##	-1.854398e+00	-8.286152e+00	-6.139765e+00	-4.579876e+00	-2.759111e+00
##	101	102	103	104	105
##	1.729502e-01	1.457625e+00	4.328534e+00	6.255458e+00	8.546014e+00
##	106	107	108	109	110
##	1.068466e+01	1.197897e+01	1.232722e+01	1.209774e+00	1.170255e+00
##	111	112	113	114	115
##	1.142827e+00	3.261883e-01	-1.169098e+00	-9.596679e-01	-6.107801e-01
##	116	117	118	119	120
##	2.117146e-01	2.543796e-01	6.959210e-01	6.382271e-01	9.185956e-01
##	121	122	123	124	125
##	-1.124793e+01	-8.254775e+00	-5.905823e+00	-4.370277e+00	-2.637238e+00
##	126	127	128	129	130
##	-1.097779e-02	-1.164441e-01	1.666013e+00	3.489001e+00	4.057341e+00
##	131	132	133	134	135
##	2.782970e+00	4.696267e+00	-1.682287e+01	-1.341552e+01	-1.208542e+01
##	136	137	138	139	140

##	-1.191603e+01	-1.142402e+01	-9.580678e+00	-4.761750e+00	-2.222475e-01
##	141	142	143	144	145
##	1.871686e+00	2.989275e+00	4.604960e+00	5.325000e+00	5.086072e+00
##	146	147	148	149	150
##	6.943415e+00	8.462902e+00	9.309865e+00	9.657875e+00	1.030292e+01
##	151	152	153	154	155
##	9.816773e+00	9.893292e+00	1.536129e+01	1.115939e+01	1.004419e+01
##	156	157	158	159	160
##	9.017586e+00	1.634079e-02	1.375612e+00	2.699144e+00	2.703790e+00
##	161	162	163	164	165
##	1.979895e-01	5.443028e-01	-2.122635e-01	-6.808453e-01	-3.643913e+00
##	166	167	168	169	170
##	-1.453507e+01	-2.248265e+01	-1.950718e+01	-4.314150e+00	-3.333299e+00
##	171	172	173	174	175
##	-3.422072e+00	-1.686822e+00	-2.958789e+00	-3.407576e+00	-2.015865e+00
##	176	177	178	179	180
##	-1.027108e+00	1.801989e+00	2.995000e+00	4.431998e+00	4.901532e+00
##	181	182	183	184	185
##	3.128547e+00	8.392432e+00	8.380568e+00	7.015207e+00	6.082830e+00
##	186	187	188	189	190
##	4.790335e+00	4.410433e+00	4.654440e+00	6.757144e+00	6.342312e+00
##	191	192	193	194	195
##	6.027507e+00	4.138620e+00	-1.185580e+01	-9.997180e+00	-8.413550e+00
##	196	197	198	199	200
##	-6.332310e+00	-4.049096e+00	-3.299498e-01	9.628671e-01	1.371274e+00
##	201	202	203	204	205
##	1.894756e+00	1.828588e+00	1.380018e+00	1.684727e+00	-8.434838e-01
##	206	207	208	209	210
##	-2.841195e-01	1.785430e+00	2.021758e+00	1.549836e+00	1.882734e+00
##	211	212	213	214	215
##	3.391000e+00	3.244930e+00	-3.625817e-01	2.836682e+00	5.179589e+00
##	216	217	218	219	220
##	7.712878e+00	-1.150761e+00	-5.783084e-01	3.336231e-01	1.896630e+00
##	221	222	223	224	225
##	-1.383402e+00	-1.232306e+01	5.955096e+00	8.148132e+00	1.005673e+01
##	226	227	228	229	230
##	1.017060e+01	8.713503e+00	6.235794e+00	-1.177515e+01	-1.082052e+01
##	231	232	233	234	235
##	-9.142101e+00	-7.615583e+00	-6.291606e+00	-4.467059e+00	-3.243889e+00
##	236	237	238	239	240
##	-2.014144e+00	4.462072e-01	-1.192313e+00	-4.647344e+00	-4.530413e+00
##	241	242	243	244	245
##	-6.398611e-01	-2.215842e-01	4.881803e-01	-1.733616e-01	-8.146118e-01
##	246	247	248	249	250
##	-7.645055e-01	4.835908e-01	3.159077e-01	1.495921e+00	1.361286e+00
##	251	252	253	254	255
##	1.338804e+00	1.499633e+00	-1.407535e+01	-1.296343e+01	-1.096812e+01
##	256	257	258	259	260
##	-8.553560e+00	-6.071162e+00	-3.056797e+00	-2.927917e-01	2.942422e+00
##	261	262	263	264	265
##	2.878117e+00	-3.683159e-01	-3.105681e+00	-1.292431e+00	-1.224904e+01
##	266	267	268	269	270
##	-1.133832e+01	-1.001010e+01	-6.868440e+00	-4.222771e+00	-2.633219e+00
##	271	272	273	274	275

##	2.455167e+00	2.501659e+00	2.290227e+00	2.572022e+00	3.458475e-01
##	276	277	278	279	280
##	-2.788424e+00	-5.739226e+00	-5.175646e+00	-3.712868e+00	-2.141245e+00
##	281	282	283	284	285
##	1.622035e-01	4.984321e+00	7.918860e+00	9.132450e+00	8.124146e+00
##	286	287	288	289	290
##	7.404552e+00	8.916859e+00	7.924756e+00	2.732699e+00	6.226414e+00
##	291	292	293	294	295
##	1.577739e+00	1.353914e+01	1.743943e+01	1.752475e+01	1.688756e+01
##	296	297	298	299	300
##	1.561416e+01	1.549215e+01	1.450538e+01	1.350697e+01	1.054317e+01
##	301	302	303	304	305
##	-4.727165e+00	-9.286003e-01	1.227873e+00	2.721730e+00	2.719096e+00
##	306	307	308	309	310
##	3.621930e+00	5.245240e+00	5.445442e+00	5.218083e+00	6.130910e+00
##	311	312	313	314	315
##	8.012761e+00	7.566182e+00	-9.068294e+00	-8.109536e+00	-7.360278e+00
##	316	317	318	319	320
##	-7.775504e+00	-5.574828e+00	6.413103e-01	1.983876e+00	3.658732e+00
##	321	322	323	324	325
##	7.124900e+00	1.035504e+01	1.340042e+01	1.630986e+01	-7.733884e+00
##	326	327	328	329	330
##	-7.476368e+00	-5.917328e+00	-3.651258e+00	-2.130417e+00	7.648539e-01
##	331	332	333	334	335
##	2.143782e+00	1.783929e+00	3.157188e+00	3.412385e+00	7.960922e+00
##	336	337	338	339	340
##	8.275816e+00	-1.318635e+01	-1.096190e+01	-8.106640e+00	-5.198790e+00
##	341	342	343	344	345
##	-3.863238e+00	-3.264781e+00	-5.586813e+00	-3.553779e+00	-4.212357e+00
##	346	347	348	349	350
##	-6.488845e+00	-6.480598e+00	-4.479411e+00	1.286006e-01	1.860723e+00
##	351	352	353	354	355
##	3.447375e+00	4.479554e+00	5.165860e+00	6.833792e+00	1.053271e+01
##	356	357	358	359	360
##	1.126784e+01	1.147196e+01	1.234209e+01	1.198143e+01	1.077295e+01
##	361	362	363	364	365
##	-1.124171e+01	-9.903368e+00	-8.630893e+00	-7.651288e+00	-6.440079e+00
##	366	367	368	369	370
##	-4.346303e+00	-3.016292e+00	-7.653528e-01	-1.114622e+00	-5.844398e+00
##	371	372	373	374	375
##	-6.330329e+00	-4.286434e+00	2.689093e+00	3.476436e+00	3.875923e+00
##	376	377	378	379	380
##	3.232886e+00	2.030897e+00	1.295942e+00	-2.002060e-01	4.863129e-01
##	381	382	383	384	385
##	5.631963e+00	5.472407e+00	5.295168e+00	4.243346e+00	-3.998152e+00
##	386	387	388	389	390
##	-1.822412e+00	2.460667e+00	4.716216e+00	7.737771e+00	8.112932e+00
##	391	392	393	394	395
##	8.029910e+00	8.242371e+00	1.098537e+01	1.296765e+01	1.267459e+01
##	396	397	398	399	400
##	1.089437e+01	1.705132e+00	2.327637e+00	1.472938e+00	9.663015e-01
##	401	402	403	404	405
##	-2.978273e-01	-8.980424e-01	-9.695345e-01	-8.447440e-01	1.082663e+00
##	406	407	408	409	410

##	1.721329e+00	2.447495e+00	1.233661e+00	2.729809e+00	2.620299e+00
##	411	412	413	414	415
##	1.463080e+00	7.298244e-01	-1.782449e-01	3.753618e-01	-1.898182e-01
##	416	417	418	419	420
##	-1.253274e+00	-1.144429e+00	-1.381738e+00	-9.528048e-01	-5.769797e-01
##	421	422	423	424	425
##	-2.240035e+01	-2.047822e+01	-1.855891e+01	-1.617530e+01	-1.557687e+01
##	426	427	428	429	430
##	-1.190031e+01	-9.036645e+00	-7.810497e+00	-4.633385e+00	-1.175145e+00
##	431	432	433	434	435
##	-1.017682e+00	-3.340169e-01	-5.845742e+00	-2.784545e+00	2.289591e-01
##	436	437	438	439	440
##	3.563617e+00	4.083342e+00	4.536510e+00	5.932164e+00	8.138092e+00
##	441	442	443	444	445
##	1.014072e+01	1.019840e+01	9.127377e+00	8.180257e+00	-1.118489e+01
##	446	447	448	449	450
##	-8.781039e+00	-6.150331e+00	-5.069691e+00	-4.150404e+00	-3.611155e+00
##	451	452	453	454	455
##	-1.225784e+00	2.562560e+00	4.174474e+00	6.496620e+00	1.047783e+01
##	456	457	458	459	460
##	9.832651e+00	-1.000671e+01	-7.689924e+00	-6.394343e+00	-4.675977e+00
##	461	462	463	464	465
##	-3.748636e+00	-4.250761e+00	-3.491912e+00	-5.701114e-01	3.505431e+00
##	466	467	468	469	470
##	6.249453e+00	7.742138e+00	7.926913e+00	-1.306556e+01	-1.072836e+01
##	471	472	473	474	475
##	-7.821714e+00	-5.477925e+00	-3.432010e+00	-6.021189e+00	-4.211451e+00
##	476	477	478	479	480
##	2.252653e+00	5.301536e+00	6.791841e+00	7.676016e+00	8.248147e+00
##	481	482	483	484	485
##	-6.247830e+00	-5.806090e+00	-6.936986e+00	-9.231220e+00	-5.107540e+00
##	486	487	488	489	490
##	-6.579711e+00	-4.667741e+00	-3.012436e+00	-2.456902e+00	-9.411776e+00
##	491	492	493	494	495
##	-1.677183e+01	-1.837347e+01	-3.685950e+00	-1.947155e+00	-6.907527e-01
##	496	497	498	499	500
##	-4.027744e-01	7.711725e-01	1.305410e+00	3.484826e-01	2.971615e+00
##	501	502	503	504	505
##	5.568775e+00	5.179312e+00	8.528324e+00	1.281373e+01	-6.344277e+00
##	506	507	508	509	510
##	-4.135481e+00	-1.598079e+00	-1.285101e+00	-6.641543e-01	4.720832e-01
##	511	512	513	514	515
##	5.661558e-01	2.394288e+00	6.395993e+00	6.005633e+00	7.100976e+00
##	516	517	518	519	520
##	7.096634e+00	1.956138e+00	1.544446e+00	9.824789e-01	7.761977e-01
##	521	522	523	524	525
##	-4.836225e-01	4.666526e-01	1.051457e+00	2.248991e-01	1.293569e+00
##	526	527	528	529	530
##	1.556043e+00	1.341966e+00	9.125966e-01	2.059362e+00	1.823688e+00
##	531	532	533	534	535
##	1.738832e+00	1.032055e+00	6.065354e-02	4.412522e-01	6.286220e-01
##	536	537	538	539	540
##	1.374799e+00	1.545874e+00	2.331746e+00	2.349677e+00	2.979603e+00
##	541	542	543	544	545

##	-2.420340e+01	-2.344774e+01	-2.437133e+01	-2.220798e+01	-2.072554e+01
##	546	547	548	549	550
##	-2.205209e+01	-1.522006e+01	-9.559720e+00	-9.482993e+00	-1.110302e+01
##	551	552	553	554	555
##	-1.344193e+01	-1.391545e+01	-1.288140e+01	-1.141304e+01	-1.076495e+01
##	556	557	558	559	560
##	-1.051210e+01	-8.301327e+00	-6.088227e+00	-1.871892e+00	4.437396e+00
##	561	562	563	564	565
##	7.105739e+00	1.047429e+01	1.256661e+01	1.287585e+01	2.013794e+00
##	566	567	568	569	570
##	6.307903e-01	-1.546981e-01	-7.770145e-01	-2.260753e+00	-1.851605e+00
##	571	572	573	574	575
##	-1.151894e+00	-1.045115e+00	-4.357425e-01	4.367704e-01	1.113242e+00
##	576	577	578	579	580
##	1.272183e+00	-5.029680e+00	-4.538769e+00	-3.969764e+00	-1.882564e+00
##	581	582	583	584	585
##	-4.628817e-01	2.853766e+00	5.897049e+00	8.165261e+00	9.196346e+00
##	586	587	588	589	590
##	9.552643e+00	8.601450e+00	8.680790e+00	6.297661e+00	5.515049e+00
##	591	592	593	594	595
##	5.466682e+00	4.040241e+00	2.001822e+00	2.422545e+00	3.370150e+00
##	596	597	598	599	600
##	4.343697e+00	3.993671e+00	4.273719e+00	3.121935e+00	2.655872e+00
##	601	602	603	604	605
##	-1.439308e+01	-1.290381e+01	-1.050909e+01	-8.830738e+00	-6.939042e+00
##	606	607	608	609	610
##	-6.253649e+00	-4.042542e+00	-3.319053e-01	1.885582e+00	4.383324e+00
##	611	612	613	614	615
##	6.732715e+00	7.465082e+00	-9.694100e+00	-9.768631e+00	-1.004327e+01
##	616	617	618	619	620
##	-8.869023e+00	-7.605471e+00	-7.072020e+00	-4.773785e+00	-1.590184e+00
##	621	622	623	624	625
##	1.551748e+00	3.671446e+00	5.186909e+00	7.543988e+00	-6.335692e+00
##	626	627	628	629	630
##	-8.411665e+00	-9.007892e+00	-1.065453e+01	-1.080769e+01	-9.239820e+00
##	631	632	633	634	635
##	-8.148133e+00	-5.142753e+00	-3.225256e+00	-2.175723e+00	1.185574e+00
##	636	637	638	639	640
##	2.018238e+00	-1.650719e+01	-1.285525e+01	-1.029384e+01	-5.851323e+00
##	641	642	643	644	645
##	-5.149113e+00	-4.316747e+00	-3.371110e+00	-3.705693e-01	2.970102e+00
##	646	647	648	649	650
##	5.240881e+00	7.166247e+00	1.041273e+01	-1.365503e+01	-1.099934e+01
##	651	652	653	654	655
##	-7.886674e+00	-5.864570e+00	-2.876619e+00	-1.342184e+00	2.381294e+00
##	656	657	658	659	660
##	6.234228e+00	7.979867e+00	9.027754e+00	1.009682e+01	1.059377e+01
##	661	662	663	664	665
##	2.615584e+00	4.956648e+00	5.696382e+00	5.707890e+00	5.237197e+00
##	666	667	668	669	670
##	4.345065e+00	3.979159e+00	2.045082e+00	1.668587e+00	2.920557e+00
##	671	672	673	674	675
##	3.889910e+00	2.301263e+00	1.111208e+00	2.334630e+00	2.008940e+00
##	676	677	678	679	680

##	1.773112e+00	1.306621e+00	3.356619e-01	-8.292123e-01	-9.292522e-01
##	681	682	683	684	685
##	4.186386e-01	1.398392e+00	9.571343e-01	8.062349e-02	6.859652e+00
##	686	687	688	689	690
##	5.817922e+00	5.077920e+00	3.007679e+00	2.303531e+00	2.117504e+00
##	691	692	693	694	695
##	1.578572e+00	5.927703e-01	2.707289e+00	1.964836e+00	2.633532e+00
##	696	697	698	699	700
##	2.635734e+00	-6.508863e+00	-4.276466e+00	-1.840863e+00	1.222255e+00
##	701	702	703	704	705
##	4.405781e+00	6.985188e+00	8.946198e+00	9.793388e+00	9.984266e+00
##	706	707	708	709	710
##	9.631639e+00	9.231531e+00	8.199344e+00	-9.069820e+00	-7.762947e+00
##	711	712	713	714	715
##	-5.068369e+00	-7.155666e-01	-6.419206e-01	1.019039e+00	3.697632e+00
##	716	717	718	719	720
##	6.481896e+00	6.422481e+00	7.519826e+00	1.075559e+01	1.106398e+01
##	721	722	723	724	725
##	-1.342270e+01	-1.178855e+01	-1.167099e+01	-1.141859e+01	-1.274778e+01
##	726	727	728	729	730
##	-1.206484e+01	-6.395352e+00	-1.834794e+00	1.487826e-01	1.332264e+00
##	731	732	733	734	735
##	1.801868e+00	1.399574e+00	-1.555965e+01	-1.589755e+01	-1.533185e+01
##	736	737	738	739	740
##	-1.290399e+01	-1.099869e+01	-1.113124e+01	-9.408201e+00	-4.547799e+00
##	741	742	743	744	745
##	-5.980744e-01	4.067580e-01	-4.348642e+00	-2.002054e+00	4.076903e+00
##	746	747	748	749	750
##	5.462004e+00	5.429495e+00	5.012629e+00	3.371138e+00	2.801526e+00
##	751	752	753	754	755
##	2.832469e+00	3.295793e+00	2.422376e+00	2.699740e-01	-8.347663e-01
##	756	757	758	759	760
##	-1.220584e+00	4.598829e+00	4.729238e+00	3.949193e+00	3.908916e+00
##	761	762	763	764	765
##	1.250901e+00	2.346061e+00	2.526042e+00	2.766881e+00	3.652775e+00
##	766	767	768	769	770
##	3.761633e+00	4.792290e+00	4.556583e+00	3.569266e+00	3.449424e+00
##	771	772	773	774	775
##	2.550639e+00	2.728388e+00	2.158247e+00	2.186822e+00	2.439065e+00
##	776	777	778	779	780
##	2.621181e+00	2.494933e+00	2.915669e+00	3.282739e+00	3.409854e+00
##	781	782	783	784	785
##	6.258941e-01	5.427420e-01	2.719305e+00	3.317829e+00	3.179605e+00
##	786	787	788	789	790
##	5.225956e+00	7.095936e+00	7.272562e+00	5.978419e+00	6.801941e+00
##	791	792	793	794	795
##	6.738355e+00	6.875360e+00	4.249818e+00	4.246320e+00	3.939428e+00
##	796	797	798	799	800
##	3.246115e+00	1.824105e+00	2.802098e+00	3.234136e+00	3.587730e+00
##	801	802	803	804	805
##	2.753518e+00	3.481540e+00	4.853601e+00	4.604640e+00	-9.468166e+00
##	806	807	808	809	810
##	-8.623415e+00	-8.007691e+00	-5.807861e+00	1.289233e+00	3.364882e+00
##	811	812	813	814	815

##	2.795184e+00	4.364127e+00	8.691941e+00	9.940974e+00	1.098405e+01
##	816	817	818	819	820
##	1.089745e+01	-5.358336e+00	-3.792905e+00	-9.643783e-02	1.230782e+00
##	821	822	823	824	825
##	2.912018e+00	5.202473e+00	7.295268e+00	7.783223e+00	7.853661e+00
##	826	827	828	829	830
##	2.860187e+00	-9.146168e-02	1.951144e+00	3.855792e-01	1.324218e+00
##	831	832	833	834	835
##	3.633004e+00	4.574087e+00	4.023288e+00	6.327246e+00	8.267787e+00
##	836	837	838	839	840
##	9.814855e+00	9.962971e+00	1.435347e+01	1.351009e+01	1.442371e+01
##	841	842	843	844	845
##	-1.759656e+00	3.834579e-01	2.723427e+00	2.808715e+00	4.332625e+00
##	846	847	848	849	850
##	2.876077e+00	3.649255e+00	2.830526e+00	2.326044e+00	2.387176e+00
##	851	852	853	854	855
##	3.234482e+00	3.183254e+00	-3.277780e+01	-3.069930e+01	-2.680554e+01
##	856	857	858	859	860
##	-2.126018e+01	-2.070534e+01	-1.392616e+01	-6.608781e+00	-2.828318e+00
##	861	862	863	864	865
##	-3.636259e+00	-3.871658e+00	-1.964783e+00	-3.786919e+00	-6.276455e+00
##	866	867	868	869	870
##	-4.655117e+00	-1.515590e+00	-1.590478e-01	-4.585392e-01	-1.004267e+00
##	871	872	873	874	875
##	9.321681e-01	4.828026e+00	4.109224e+00	3.069772e+00	3.312571e+00
##	876	877	878	879	880
##	3.301340e+00	3.330501e+00	5.254648e+00	6.244745e+00	5.381490e+00
##	881	882	883	884	885
##	6.691242e+00	5.718665e+00	8.022964e+00	1.037394e+01	1.091701e+01
##	886	887	888	889	890
##	5.163778e+00	-6.409581e+00	-1.015513e+01	-5.836502e+00	-5.468589e+00
##	891	892	893	894	895
##	-4.629717e+00	-4.587273e+00	-4.501357e+00	-1.448533e+00	5.849046e-01
##	896	897	898	899	900
##	2.791428e+00	-4.361831e+00	-2.572388e+00	1.063495e-01	4.120680e+00
##	901	902	903	904	905
##	-1.355105e+01	-1.407484e+01	-1.721000e+01	-2.337951e+01	-2.178045e+01
##	906	907	908	909	910
##	-1.747919e+01	-1.079598e+01	-3.448992e+00	7.502391e-01	3.702172e+00
##	911	912	913	914	915
##	4.824696e+00	4.066590e+00	-1.536080e+01	-1.398789e+01	-1.228669e+01
##	916	917	918	919	920
##	-1.020578e+01	-8.805094e+00	-5.730596e+00	-2.214166e+00	-8.237719e-01
##	921	922	923	924	925
##	2.919503e+00	6.134600e+00	9.262417e+00	1.011550e+01	-4.327618e+00
##	926	927	928	929	930
##	-4.388001e+00	-3.414613e+00	-3.570682e+00	-2.681617e+00	-1.740892e+00
##	931	932	933	934	935
##	5.287413e-01	2.307778e+00	5.286150e+00	1.626764e+00	-5.267192e-01
##	936	937	938	939	940
##	1.657477e+00	-5.580910e+00	-1.844654e+00	7.980598e-01	3.492681e+00
##	941	942	943	944	945
##	5.250484e+00	5.014289e+00	5.648118e+00	6.603387e+00	5.050836e+00
##	946	947	948	949	950

##	3.514220e+00	4.559005e+00	4.085225e+00	-8.606393e+00	-7.663168e+00
##	951	952	953	954	955
##	-6.132863e+00	-5.370903e+00	-4.423716e+00	-4.082534e+00	-9.984835e-01
##	956	957	958	959	960
##	5.947405e-01	1.970636e+00	2.922141e+00	3.277280e+00	5.157128e+00
##	961	962	963	964	965
##	-5.920884e+00	-5.216943e+00	-5.168531e+00	-5.624457e+00	-4.403446e+00
##	966	967	968	969	970
##	-1.501286e+00	1.337943e+00	4.228832e+00	6.780723e+00	8.157681e+00
##	971	972	973	974	975
##	9.448142e+00	1.024952e+01	-3.663584e+00	3.161816e+00	3.487956e+00
##	976	977	978	979	980
##	4.979276e+00	6.033093e+00	4.949058e+00	6.782189e+00	6.625059e+00
##	981	982	983	984	985
##	5.644518e+00	4.924864e+00	4.506411e+00	3.720033e+00	-8.647265e+00
##	986	987	988	989	990
##	-5.693270e+00	-3.453343e+00	-3.558471e+00	-2.721897e+00	-1.056600e+00
##	991	992	993	994	995
##	-5.744461e-01	2.367156e+00	3.597789e+00	5.555096e+00	5.987247e+00
##	996	997	998	999	1000
##	6.365489e+00	-4.697509e+00	-2.943248e+00	-1.169175e+00	5.807437e-01
##	1001	1002	1003	1004	1005
##	1.837014e+00	2.335246e+00	2.701124e+00	4.124186e+00	7.439665e+00
##	1006	1007	1008	1009	1010
##	9.260826e+00	9.676078e+00	8.345559e+00	2.021024e+00	1.532367e+00
##	1011	1012	1013	1014	1015
##	1.851854e+00	3.288817e+00	4.434828e+00	5.099872e+00	4.818725e+00
##	1016	1017	1018	1019	1020
##	5.209244e+00	1.011607e+01	1.079755e+01	9.215329e+00	6.881930e+00
##	1021	1022	1023	1024	1025
##	-1.048783e+01	-7.704600e+00	-4.807165e+00	-3.138787e+00	-1.624741e+00
##	1026	1027	1028	1029	1030
##	-4.842426e-01	2.334101e+00	5.199616e+00	7.346520e+00	9.516985e+00
##	1031	1032	1033	1034	1035
##	1.072698e+01	1.093932e+01	-1.130095e+01	-9.279904e+00	-7.875075e+00
##	1036	1037	1038	1039	1040
##	-6.072464e+00	-5.927490e+00	-6.773248e-01	3.220997e-01	1.818588e+00
##	1041	1042	1043	1044	1045
##	2.800212e+00	3.688797e+00	-1.098064e+00	-5.247077e+00	-3.347409e+00
##	1046	1047	1048	1049	1050
##	1.769463e+00	4.106133e+00	9.267512e+00	1.276802e+01	1.543371e+01
##	1051	1052	1053	1054	1055
##	1.630837e+01	1.740237e+01	1.925682e+01	1.876070e+01	1.508945e+01
##	1056	1057	1058	1059	1060
##	1.359400e+01	-1.467564e+01	-1.183359e+01	-1.027911e+01	-9.007220e+00
##	1061	1062	1063	1064	1065
##	-6.193062e+00	-3.910675e+00	-2.035559e+00	8.932230e-01	1.808790e+00
##	1066	1067	1068	1069	1070
##	-1.488479e+00	-9.282919e+00	-9.257076e+00	-7.714091e+00	-6.950890e+00
##	1071	1072	1073	1074	1075
##	-5.976550e+00	-4.201764e+00	-1.682186e+00	8.574949e-01	3.414737e+00
##	1076	1077	1078	1079	1080
##	5.713154e+00	7.674313e+00	1.037556e+01	1.191305e+01	1.409081e+01
##	1081	1082	1083	1084	1085

##	4.757504e+00	3.667673e+00	2.848327e+00	1.898109e+00	1.336524e-01
##	1086	1087	1088	1089	1090
##	6.078889e-01	1.342770e+00	1.281813e+00	8.241609e-01	4.145893e-01
##	1091	1092	1093	1094	1095
##	-4.214746e-04	4.985756e-01	6.219441e-01	2.432482e-01	6.091789e-01
##	1096	1097	1098	1099	1100
##	1.051135e-01	-3.973740e-01	-1.651125e-01	7.602216e-01	6.091788e-01
##	1101	1102	1103	1104	1105
##	2.908834e+00	2.980996e+00	3.727448e+00	4.127723e+00	-1.618837e+01
##	1106	1107	1108	1109	1110
##	-1.395407e+01	-1.117359e+01	-9.980930e+00	-6.795351e+00	-5.797080e+00
##	1111	1112	1113	1114	1115
##	-1.194249e-01	3.938922e+00	1.037138e+01	1.263940e+01	1.426112e+01
##	1116	1117	1118	1119	1120
##	1.543910e+01	-9.229475e+00	-8.851013e+00	-9.453584e+00	-9.286494e+00
##	1121	1122	1123	1124	1125
##	-8.019415e+00	-5.885800e+00	-5.566125e+00	-1.016980e+00	2.992975e+00
##	1126	1127	1128	1129	1130
##	6.927676e+00	9.815113e+00	1.192993e+01	-1.326106e+01	-1.196300e+01
##	1131	1132	1133	1134	1135
##	-1.078087e+01	-8.040496e+00	-1.059039e+01	-1.019515e+01	-6.961961e+00
##	1136	1137	1138	1139	1140
##	-4.811098e+00	-5.541426e+00	-5.575811e+00	-6.381722e+00	-7.984878e+00
##	1141	1142	1143	1144	1145
##	4.277373e+00	3.840696e+00	2.665728e+00	1.628793e+00	6.478322e-01
##	1146	1147	1148	1149	1150
##	-5.649185e-02	-4.699493e-01	-2.077745e+00	-1.270247e+00	-1.910119e+00
##	1151	1152	1153	1154	1155
##	-1.845467e+00	-1.535508e+00	-1.645258e+01	-1.566818e+01	-1.481447e+01
##	1156	1157	1158	1159	1160
##	-1.501614e+01	-1.667385e+01	-1.237133e+01	-7.760717e+00	-5.572833e+00
##	1161	1162	1163	1164	1165
##	-2.339348e+00	-1.513611e+00	1.493974e-01	5.802034e-01	-2.338486e+00
##	1166	1167	1168	1169	1170
##	-9.516405e-01	5.511129e-01	1.339181e+00	2.560022e+00	3.721560e+00
##	1171	1172	1173	1174	1175
##	4.113767e+00	4.802504e+00	6.171888e+00	6.827778e+00	8.443791e+00
##	1176	1177	1178	1179	1180
##	8.473259e+00	-1.403660e+00	1.115399e+00	2.240745e+00	2.618570e+00
##	1181	1182	1183	1184	1185
##	3.138123e+00	5.622477e+00	5.145558e+00	6.166422e+00	7.617803e+00
##	1186	1187	1188	1189	1190
##	8.287663e+00	8.980099e+00	7.386127e+00	8.066511e+00	8.218895e+00
##	1191	1192	1193	1194	1195
##	8.975513e+00	8.993227e+00	9.076019e+00	7.491132e+00	5.736342e+00
##	1196	1197	1198	1199	1200
##	6.769060e+00	7.210797e+00	8.284285e+00	1.061101e+01	1.078514e+01
##	1201	1202	1203	1204	1205
##	-1.618593e+01	-1.484847e+01	-1.331831e+01	-1.227205e+01	-8.483722e+00
##	1206	1207	1208	1209	1210
##	-5.957359e+00	-3.200912e+00	-3.762732e-01	4.957472e+00	4.596285e+00
##	1211	1212	1213	1214	1215
##	6.015154e+00	5.628901e+00	-3.235383e+00	-1.297799e+00	1.590842e+00
##	1216	1217	1218	1219	1220

##	2.427512e+00	3.324433e+00	3.836600e+00	5.080888e+00	8.604261e+00
##	1221	1222	1223	1224	1225
##	1.057385e+01	1.178118e+01	1.314944e+01	1.297728e+01	6.372926e-01
##	1226	1227	1228	1229	1230
##	3.742192e+00	4.602170e+00	4.844382e+00	4.405903e+00	2.781120e+00
##	1231	1232	1233	1234	1235
##	4.421246e+00	3.476202e+00	4.831654e+00	4.304123e+00	4.823200e+00
##	1236	1237	1238	1239	1240
##	3.626529e+00	1.437425e+00	1.386255e+00	2.373381e+00	2.088968e+00
##	1241	1242	1243	1244	1245
##	1.812009e+00	1.953456e+00	3.098975e+00	3.516625e+00	2.488594e+00
##	1246	1247	1248	1249	1250
##	2.886113e+00	3.163470e+00	3.747737e+00	5.860144e+00	8.126087e+00
##	1251	1252	1253	1254	1255
##	6.952973e+00	5.870429e+00	4.618630e+00	5.322319e+00	5.163502e+00
##	1256	1257	1258	1259	1260
##	4.589984e+00	2.393498e+00	2.144501e+00	4.134479e+00	4.894191e+00
##	1261	1262	1263	1264	1265
##	-4.642331e+00	-2.431216e+00	-1.000459e+00	-1.136812e-01	1.707421e+00
##	1266	1267	1268	1269	1270
##	5.806214e+00	6.960549e+00	8.931047e+00	9.455068e+00	1.065255e+01
##	1271	1272	1273	1274	1275
##	1.129310e+01	1.035867e+01	2.460990e+00	3.608542e+00	4.770870e+00
##	1276	1277	1278	1279	1280
##	2.145720e+00	2.760753e+00	1.706342e+00	1.685657e+00	1.476438e+00
##	1281	1282	1283	1284	1285
##	4.541664e+00	3.998943e+00	5.006053e+00	3.509738e+00	-3.020437e+00
##	1286	1287	1288	1289	1290
##	-2.284787e+00	-1.630375e+00	7.842699e-01	6.714925e-02	-5.943439e-01
##	1291	1292	1293	1294	1295
##	-1.681919e+00	-3.553508e+00	-2.279621e+01	-8.436792e+00	-3.518746e+00
##	1296	1297	1298	1299	1300
##	-1.479832e+00	-1.409952e+00	1.246100e+00	2.352767e+00	2.729049e+00
##	1301	1302	1303	1304	1305
##	3.929824e+00	4.946955e+00	6.040167e+00	9.268558e+00	1.078352e+01
##	1306	1307	1308	1309	1310
##	1.189250e+01	1.283598e+01	1.262642e+01	-2.476457e+01	-2.373322e+01
##	1311	1312	1313	1314	1315
##	-2.366541e+01	-2.282371e+01	-2.207347e+01	-1.995011e+01	-1.551055e+01
##	1316	1317	1318	1319	1320
##	-8.332831e+00	-7.192888e+00	-3.848777e+00	-2.088071e+00	-2.029939e+00
##	1321	1322	1323	1324	1325
##	-1.480647e+01	-1.340914e+01	-1.173981e+01	-9.411714e+00	-7.082774e+00
##	1326	1327	1328	1329	1330
##	-3.827529e+00	-9.126732e-02	3.734725e+00	6.603506e+00	8.445484e+00
##	1331	1332	1333	1334	1335
##	9.123340e+00	9.581204e+00	-1.686339e+00	-7.699964e-01	1.154908e-01
##	1336	1337	1338	1339	1340
##	4.854538e-01	-4.053571e-02	-2.054907e-01	-1.659638e+00	-9.771195e-01
##	1341	1342	1343	1344	1345
##	3.933533e+00	5.885240e+00	7.619292e+00	5.870558e+00	-1.755190e+01
##	1346	1347	1348	1349	1350
##	-1.742699e+01	-1.711966e+01	-1.642103e+01	-1.610516e+01	-1.468310e+01
##	1351	1352	1353	1354	1355

##	-1.372397e+01	-1.112260e+01	-1.118481e+01	-4.405986e+00	-4.943368e+00
##	1356	1357	1358	1359	1360
##	-5.148497e+00	4.380808e+00	5.437175e+00	5.899559e+00	5.497203e+00
##	1361	1362	1363	1364	1365
##	2.478068e+00	1.522090e+00	-5.502985e-02	-8.616122e-02	-1.485839e-01
##	1366	1367	1368	1369	1370
##	-1.321104e+00	-3.145547e-01	-1.373765e+00	1.748581e+00	3.301086e+00
##	1371	1372	1373	1374	1375
##	4.456387e+00	4.119751e+00	2.315622e+00	1.395407e+00	1.423915e+00
##	1376	1377	1378	1379	1380
##	1.208705e+00	3.499676e+00	2.776815e+00	2.878829e+00	1.098883e+00
##	1381	1382	1383	1384	1385
##	4.518564e+00	4.025907e+00	3.365394e+00	1.382357e+00	-2.896325e-01
##	1386	1387	1388	1389	1390
##	-9.045875e-01	-2.127735e+00	-1.314216e+00	2.371189e+00	2.277941e+00
##	1391	1392	1393	1394	1395
##	2.248338e+00	1.657293e+00	-1.705129e+01	-1.591253e+01	-1.462125e+01
##	1396	1397	1398	1399	1400
##	-1.208828e+01	-9.892635e+00	-1.011416e+01	-7.372769e+00	-5.207697e+00
##	1401	1402	1403	1404	1405
##	-8.663901e+00	-4.559807e+00	-1.968791e+00	-1.554694e-01	-1.700289e+01
##	1406	1407	1408	1409	1410
##	-1.528320e+01	-1.373789e+01	-1.352427e+01	-1.249171e+01	-1.094031e+01
##	1411	1412	1413	1414	1415
##	-8.853053e+00	-5.418246e+00	-3.692914e+00	-5.635456e+00	-1.276295e+01
##	1416	1417	1418	1419	1420
##	-1.833637e+01	4.684877e+00	4.938546e+00	6.110936e+00	5.009555e+00
##	1421	1422	1423	1424	1425
##	4.226770e+00	3.720201e+00	5.203560e+00	4.761150e+00	4.039813e+00
##	1426	1427	1428	1429	1430
##	4.446149e+00	3.821192e+00	3.731234e+00	7.959312e+00	1.190796e+01
##	1431	1432	1433	1434	1435
##	1.262889e+01	1.423845e+01	1.445689e+01	1.447484e+01	1.559835e+01
##	1436	1437	1438	1439	1440
##	1.476019e+01	1.497119e+01	1.326057e+01	1.257871e+01	1.184777e+01
##	1441	1442	1443	1444	1445
##	-1.435839e+01	-1.413611e+01	-1.374379e+01	-1.050180e+01	-8.134467e+00
##	1446	1447	1448	1449	1450
##	-7.797841e+00	-3.996482e+00	-6.670494e-01	1.232488e+00	2.295671e+00
##	1451	1452	1453	1454	1455
##	1.611448e+00	1.557726e+00	-8.715219e+00	-7.375264e+00	-9.166109e+00
##	1456	1457	1458	1459	1460
##	-1.039978e+01	-9.605938e+00	-7.601960e+00	-4.827550e+00	-2.901386e+00
##	1461	1462	1463	1464	1465
##	-1.141336e+00	-6.059287e+00	-1.700729e+01	-2.201342e+01	4.885693e+00
##	1466	1467	1468	1469	1470
##	4.251591e+00	3.297129e+00	2.295725e+00	1.545603e+00	1.796426e+00
##	1471	1472	1473	1474	1475
##	2.005343e+00	1.664728e+00	2.530932e+00	3.286539e+00	2.679775e+00
##	1476	1477	1478	1479	1480
##	2.320003e+00	-1.950518e+00	-2.650831e+00	-2.998009e+00	-2.531095e+00
##	1481	1482	1483	1484	1485
##	-2.941690e+00	-1.265655e+00	-8.753896e-01	-2.152905e-01	-2.537384e-02
##	1486	1487	1488	1489	1490

##	1.245346e+00	1.903196e+00	2.277287e+00	-7.252188e+00	-6.980127e+00
##	1491	1492	1493	1494	1495
##	-5.254788e+00	-6.188694e-01	3.983573e-01	2.471106e+00	4.494658e+00
##	1496	1497	1498	1499	1500
##	8.459731e+00	1.015197e+01	1.088583e+01	1.225278e+01	1.315259e+01
##	1501	1502	1503	1504	1505
##	7.959667e+00	9.988716e+00	1.119406e+01	1.036886e+01	8.648334e+00
##	1506	1507	1508	1509	1510
##	7.155845e+00	6.348129e+00	4.244518e+00	2.419246e+00	1.024764e+00
##	1511	1512	1513	1514	1515
##	1.590929e+00	1.220263e+00	-4.944079e+00	-2.969896e+00	-1.975636e+00
##	1516	1517	1518	1519	1520
##	-1.818762e+00	-6.017906e-01	1.280939e+00	2.778240e+00	4.123304e+00
##	1521	1522	1523	1524	1525
##	3.090571e+00	1.496548e+00	1.585834e+00	2.699551e+00	4.219679e+00
##	1526	1527	1528	1529	1530
##	6.613910e+00	7.083155e+00	7.149826e+00	7.902254e+00	7.873214e+00
##	1531	1532	1533	1534	1535
##	8.303009e+00	7.939429e+00	5.481170e+00	3.710756e+00	4.667228e+00
##	1536	1537	1538	1539	1540
##	4.767942e+00	-9.093831e+00	-7.104357e+00	-5.586670e+00	-5.471868e+00
##	1541	1542	1543	1544	1545
##	-3.407708e+00	3.379661e-01	4.023040e+00	6.433786e+00	8.818168e+00
##	1546	1547	1548	1549	1550
##	9.580833e+00	9.616864e+00	1.050675e+01	8.417404e-01	9.803474e-01
##	1551	1552	1553	1554	1555
##	2.417320e+00	1.928609e+00	1.054777e+00	1.968936e+00	1.293867e+00
##	1556	1557	1558	1559	1560
##	3.812971e+00	4.113024e+00	2.233743e+00	-4.826693e-01	-3.438173e+00
##	1561	1562	1563	1564	1565
##	-7.588823e+00	-4.658787e+00	-3.641761e+00	-2.443164e+00	-1.870010e+00
##	1566	1567	1568	1569	1570
##	1.311674e+00	4.415623e+00	6.690807e+00	8.718121e+00	9.695855e+00
##	1571	1572	1573	1574	1575
##	9.420159e+00	8.497238e+00	-1.106947e+01	-7.578779e+00	-3.945215e+00
##	1576	1577	1578	1579	1580
##	-3.356166e+00	-2.364718e+00	-1.651591e+00	-6.774606e-02	4.727901e-01
##	1581	1582	1583	1584	1585
##	2.589841e+00	4.012818e+00	6.142514e+00	4.871541e+00	-6.390764e+00
##	1586	1587	1588	1589	1590
##	-4.239166e+00	-1.388754e+00	-1.056966e-01	2.481236e+00	2.818803e+00
##	1591	1592	1593	1594	1595
##	4.103180e+00	6.598457e+00	3.562103e+00	-2.678040e+00	-5.157957e-01
##	1596	1597	1598	1599	1600
##	2.121616e+00	8.844369e-01	1.092468e+00	5.870157e-01	1.337903e-01
##	1601	1602	1603	1604	1605
##	-1.979459e-01	-2.221310e-01	6.789633e-01	1.961982e-01	1.214991e+00
##	1606	1607	1608	1609	1610
##	8.499816e-01	1.071517e+00	1.025564e+00	-2.695166e+00	-2.144673e+00
##	1611	1612	1613	1614	1615
##	-2.143693e+00	-3.179045e+00	-3.525423e+00	-2.316591e+00	-1.367519e+00
##	1616	1617	1618	1619	1620
##	-2.494270e+00	-2.000218e+00	-2.214687e+00	-2.462828e+00	-2.321132e+00
##	1621	1622	1623	1624	1625

```

## 2.458166e+00 2.816129e+00 4.808582e+00 5.265128e+00 5.079828e+00
## 1626 1627 1628 1629 1630
## 4.783353e+00 5.586419e+00 6.076704e+00 6.172013e+00 6.583443e+00
## 1631 1632 1633 1634 1635
## 9.161566e+00 7.572356e+00 -1.101687e+01 -1.023811e+01 -6.100306e+00
## 1636 1637 1638 1639 1640
## -4.439294e+00 -3.015099e+00 -3.154557e+00 -6.725512e-01 1.975618e+00
## 1641 1642 1643 1644 1645
## 2.241912e+00 3.695234e+00 5.715943e+00 4.321247e+00 -4.324524e+00
## 1646 1647 1648 1649 1650
## -2.784816e+00 -1.421926e+00 2.667565e+00 4.298488e+00 9.641510e+00
## 1651 1652 1653 1654 1655
## 1.276807e+01 1.552043e+01 1.879539e+01 1.896964e+01 1.928485e+01
## 1656 1657 1658 1659 1660
## 1.778687e+01 -9.294268e+00 -8.354229e+00 -7.455444e+00 -5.518733e+00
## 1661 1662 1663 1664 1665
## -2.027010e+00 8.480622e-01 3.116699e+00 4.380861e+00 5.674033e+00
## 1666 1667 1668 1669 1670
## 5.649237e+00 1.073984e+01 1.515797e+01 -1.434153e+01 -1.316444e+01
## 1671 1672 1673 1674 1675
## -1.216883e+01 -1.073154e+01 -1.108749e+01 -9.862629e+00 -5.577491e+00
## 1676 1677 1678 1679 1680
## -1.743737e+00 1.335977e+00 2.754882e+00 4.589577e+00 6.808517e+00
## 1681 1682 1683 1684 1685
## -8.076986e+00 -7.164527e+00 -6.075189e+00 -6.024053e+00 -3.668108e+00
## 1686 1687 1688 1689 1690
## -1.464168e+00 -1.840058e-02 2.364425e-01 -4.467704e+00 -9.300685e+00
## 1691 1692 1693 1694 1695
## -1.034773e+01 -8.592353e+00 7.049697e+00 7.025924e+00 8.778196e+00
## 1696 1697 1698 1699 1700
## 9.763299e+00 8.557864e+00 1.188736e+01 1.339708e+01 1.631589e+01
## 1701 1702 1703 1704
## 1.449487e+01 -1.951402e-01 -5.629868e+00 8.788485e-01
##
## $effects
## (Intercept) log(gdpPercap)
## -2.455077e+03 4.305053e+02 -1.476780e+01 -1.257030e+01 -9.436450e+00
##
## -7.613765e+00 -8.102250e+00 -5.935598e+00 -2.711127e+00 -2.432078e+00
##
## -3.237944e+00 -4.097607e+00 2.976002e+00 5.341412e+00 9.358728e+00
##
## 9.217105e+00 9.094258e+00 9.774763e+00 1.102649e+01 1.235080e+01
##
## 1.545036e+01 1.467690e+01 1.418668e+01 1.274189e+01 -1.288289e+01
##
## -1.208483e+01 -8.012039e+00 -7.012153e+00 -6.109062e+00 -4.011739e+00
##
## -2.026669e+00 2.501704e+00 5.520230e+00 7.329480e+00 8.322254e+00
##
## 8.209190e+00 -2.910960e+01 -2.785534e+01 -2.680578e+01 -2.706545e+01
##
## -2.504397e+01 -1.827140e+01 -1.705064e+01 -1.598670e+01 -1.592745e+01
##

```

##	-1.436245e+01	-1.604115e+01	-1.909140e+01	-1.158262e+00	-5.380463e-01
##					
##	-1.395142e-01	-7.050297e-01	-6.624907e-01	1.851913e-01	2.635540e+00
##					
##	3.331226e+00	4.265707e+00	4.242757e+00	7.229789e+00	4.954424e+00
##					
##	8.583700e-01	1.311786e+00	9.566720e-01	-3.826636e-01	-8.148174e-01
##					
##	-2.269782e-02	7.000713e-01	1.262135e+00	1.910835e+00	1.942978e+00
##					
##	2.366000e+00	2.226352e+00	2.829935e+00	3.253455e-01	6.816523e-01
##					
##	-2.631734e-01	-2.048606e+00	-1.991036e+00	-1.760843e+00	-8.065375e-01
##					
##	-8.612475e-01	-2.955730e-02	4.978478e-01	4.023258e-01	-1.717150e+01
##					
##	-1.571617e+01	-1.342475e+01	-1.172528e+01	-1.018147e+01	-8.385422e+00
##					
##	-4.868089e+00	-2.852511e+00	-1.239038e+00	-4.723594e-01	-8.462676e-01
##					
##	-2.111884e+00	-7.357639e+00	-5.200694e+00	-3.652325e+00	-1.847124e+00
##					
##	1.127303e+00	2.397533e+00	5.260399e+00	7.154305e+00	9.410894e+00
##					
##	1.150260e+01	1.274805e+01	1.303271e+01	1.352335e+00	1.264974e+00
##					
##	1.198756e+00	3.257832e-01	-1.244108e+00	-1.077698e+00	-7.580166e-01
##					
##	4.213714e-02	4.489387e-02	4.629369e-01	3.735473e-01	6.224842e-01
##					
##	-1.045779e+01	-7.432550e+00	-5.080272e+00	-3.572075e+00	-1.853842e+00
##					
##	7.892541e-01	6.157570e-01	2.411280e+00	4.243279e+00	4.800788e+00
##					
##	3.492640e+00	5.390655e+00	-1.632310e+01	-1.284354e+01	-1.152122e+01
##					
##	-1.140547e+01	-1.095795e+01	-9.169409e+00	-4.313728e+00	2.686800e-01
##					
##	2.339728e+00	3.420846e+00	5.028405e+00	5.712888e+00	5.903767e+00
##					
##	7.657439e+00	9.103621e+00	9.875316e+00	1.013688e+01	1.071593e+01
##					
##	1.018057e+01	1.024313e+01	1.587677e+01	1.147790e+01	1.028937e+01
##					
##	9.195885e+00	8.762225e-01	2.211686e+00	3.513589e+00	3.451928e+00
##					
##	7.505079e-01	9.865683e-01	1.207632e-01	-4.452801e-01	-3.486347e+00
##					
##	-1.440376e+01	-2.242707e+01	-1.949343e+01	-3.739390e+00	-2.810404e+00
##					
##	-2.991486e+00	-1.264902e+00	-2.654424e+00	-3.194211e+00	-1.819523e+00
##					
##	-8.636790e-01	2.001952e+00	3.152413e+00	4.582643e+00	5.017985e+00
##					

##	3.656932e+00	8.855529e+00	8.734789e+00	7.284351e+00	6.299164e+00
##					
##	4.961707e+00	4.557505e+00	4.800915e+00	6.987848e+00	6.590035e+00
##					
##	6.195409e+00	4.203553e+00	-1.085477e+01	-9.036251e+00	-7.502140e+00
##					
##	-5.450878e+00	-3.190502e+00	5.725088e-01	1.839445e+00	2.209467e+00
##					
##	2.726236e+00	2.655201e+00	2.177670e+00	2.432264e+00	3.054706e-01
##					
##	8.295892e-01	2.919986e+00	3.108952e+00	2.600353e+00	2.876413e+00
##					
##	4.382708e+00	4.203507e+00	5.910409e-01	3.887866e+00	6.242324e+00
##					
##	8.787326e+00	-2.772910e-02	4.932541e-01	1.362670e+00	2.909338e+00
##					
##	-3.027200e-01	-1.131128e+01	6.912334e+00	9.076804e+00	1.098613e+01
##					
##	1.107693e+01	9.557200e+00	6.875762e+00	-1.101594e+01	-1.009684e+01
##					
##	-8.438491e+00	-6.935509e+00	-5.646157e+00	-3.839612e+00	-2.705537e+00
##					
##	-1.505489e+00	1.071944e+00	-5.487600e-01	-4.045370e+00	-3.945529e+00
##					
##	-5.945021e-01	-2.058281e-01	4.803716e-01	-2.369398e-01	-9.302096e-01
##					
##	-9.279592e-01	3.088488e-01	9.376631e-02	1.277145e+00	1.112798e+00
##					
##	1.046103e+00	1.179930e+00	-1.328773e+01	-1.220906e+01	-1.021433e+01
##					
##	-7.784384e+00	-5.283163e+00	-2.280151e+00	5.303675e-01	3.804663e+00
##					
##	3.778671e+00	5.353629e-01	-2.201231e+00	-3.737629e-01	-1.149143e+01
##					
##	-1.061356e+01	-9.304288e+00	-6.115636e+00	-3.444629e+00	-1.863469e+00
##					
##	3.335382e+00	3.326256e+00	3.081754e+00	3.379732e+00	1.109505e+00
##					
##	-2.146670e+00	-5.360881e+00	-4.825920e+00	-3.377620e+00	-1.844412e+00
##					
##	4.360584e-01	5.303461e+00	8.216371e+00	9.403285e+00	8.296185e+00
##					
##	7.486495e+00	8.978922e+00	7.923811e+00	3.829576e+00	7.209053e+00
##					
##	2.612684e+00	1.450236e+01	1.837133e+01	1.842812e+01	1.770886e+01
##					
##	1.632245e+01	1.614293e+01	1.505436e+01	1.395872e+01	1.084921e+01
##					
##	-4.157603e+00	-3.843298e-01	1.750138e+00	3.221331e+00	3.156530e+00
##					
##	4.010339e+00	5.589054e+00	5.755052e+00	5.494775e+00	6.370990e+00
##					
##	8.272017e+00	7.763609e+00	-8.289835e+00	-7.360475e+00	-6.658245e+00
##					

##	-7.163965e+00	-4.973433e+00	1.400536e+00	2.718744e+00	4.381704e+00
##					
##	7.864816e+00	1.111399e+01	1.418671e+01	1.712351e+01	-6.846753e+00
##					
##	-6.636031e+00	-5.073662e+00	-2.795176e+00	-1.289745e+00	1.645918e+00
##					
##	3.077153e+00	2.717754e+00	4.212056e+00	4.587508e+00	9.217165e+00
##					
##	9.487896e+00	-1.261407e+01	-1.041644e+01	-7.580879e+00	-4.699097e+00
##					
##	-3.420806e+00	-2.826819e+00	-5.275680e+00	-3.195608e+00	-3.840037e+00
##					
##	-6.071861e+00	-6.063605e+00	-4.075535e+00	6.343290e-01	2.325775e+00
##					
##	3.866462e+00	4.840691e+00	5.461987e+00	7.083814e+00	1.082008e+01
##					
##	1.153402e+01	1.170984e+01	1.255466e+01	1.214825e+01	1.086994e+01
##					
##	-1.053561e+01	-9.221716e+00	-7.993681e+00	-7.067933e+00	-5.903080e+00
##					
##	-3.827222e+00	-2.507643e+00	-1.976665e-01	-4.623683e-01	-5.217450e+00
##					
##	-5.678214e+00	-3.613833e+00	3.140848e+00	3.824520e+00	4.150702e+00
##					
##	3.432397e+00	2.143961e+00	1.343013e+00	-2.023458e-01	4.702085e-01
##					
##	5.770604e+00	5.561972e+00	5.333387e+00	4.209632e+00	-3.729545e+00
##					
##	-1.581035e+00	2.752972e+00	4.979041e+00	8.022602e+00	8.339777e+00
##					
##	8.213717e+00	8.417035e+00	1.125362e+01	1.324507e+01	1.290340e+01
##					
##	1.101493e+01	1.908466e+00	2.473483e+00	1.554297e+00	1.010769e+00
##					
##	-2.972608e-01	-9.356223e-01	-1.019135e+00	-9.128608e-01	1.055953e+00
##					
##	1.658300e+00	2.355532e+00	1.059819e+00	2.825259e+00	2.673142e+00
##					
##	1.452463e+00	6.689827e-01	-2.921090e-01	2.365808e-01	-3.474880e-01
##					
##	-1.457063e+00	-1.363965e+00	-1.639312e+00	-1.234349e+00	-8.875454e-01
##					
##	-2.189967e+01	-1.999974e+01	-1.809710e+01	-1.571339e+01	-1.517828e+01
##					
##	-1.144476e+01	-8.559754e+00	-7.333676e+00	-4.096248e+00	-5.667699e-01
##					
##	-4.114957e-01	2.447121e-01	-5.141707e+00	-2.111874e+00	8.785422e-01
##					
##	4.214795e+00	4.646268e+00	5.035729e+00	6.411068e+00	8.612768e+00
##					
##	1.060012e+01	1.060388e+01	9.459531e+00	8.425099e+00	-1.077131e+01
##					
##	-8.389713e+00	-5.783431e+00	-4.738587e+00	-3.864121e+00	-3.398708e+00
##					

##	-1.037515e+00	2.784455e+00	4.367576e+00	6.675630e+00	1.073611e+01
##					
##	1.003612e+01	-9.307384e+00	-6.999357e+00	-5.750604e+00	-4.054024e+00
##					
##	-3.160957e+00	-3.763442e+00	-3.076688e+00	-1.873871e-01	3.895579e+00
##					
##	6.609727e+00	8.061420e+00	8.195821e+00	-1.260658e+01	-1.030567e+01
##					
##	-7.430076e+00	-5.131313e+00	-3.096842e+00	-5.726335e+00	-3.845490e+00
##					
##	2.615402e+00	5.642033e+00	7.085724e+00	7.958127e+00	8.508876e+00
##					
##	-5.130857e+00	-4.728724e+00	-5.958066e+00	-8.394242e+00	-4.173546e+00
##					
##	-5.757147e+00	-3.834933e+00	-2.192591e+00	-1.686617e+00	-8.927711e+00
##					
##	-1.660420e+01	-1.834915e+01	-2.527254e+00	-8.026748e-01	4.217732e-01
##					
##	6.445790e-01	1.789397e+00	2.328915e+00	1.360325e+00	3.985705e+00
##					
##	6.547687e+00	6.017020e+00	9.421632e+00	1.376258e+01	-5.215805e+00
##					
##	-3.021225e+00	-5.157773e-01	-2.679715e-01	3.238462e-01	1.465365e+00
##					
##	1.547774e+00	3.378155e+00	7.476877e+00	7.022902e+00	8.109733e+00
##					
##	8.022147e+00	2.180822e+00	1.718589e+00	1.088498e+00	8.341222e-01
##					
##	-5.116895e-01	4.124225e-01	9.431907e-01	7.525764e-02	1.151356e+00
##					
##	1.370176e+00	1.101730e+00	6.210468e-01	2.255750e+00	1.954430e+00
##					
##	1.807324e+00	1.035235e+00	-3.522371e-03	3.370908e-01	4.918325e-01
##					
##	1.211693e+00	1.347287e+00	2.118423e+00	2.101503e+00	2.715087e+00
##					
##	-2.385206e+01	-2.314277e+01	-2.415661e+01	-2.206601e+01	-2.068115e+01
##					
##	-2.221059e+01	-1.526422e+01	-9.527816e+00	-9.492191e+00	-1.113895e+01
##					
##	-1.342697e+01	-1.391723e+01	-1.184488e+01	-1.039882e+01	-9.794961e+00
##					
##	-9.605983e+00	-7.404192e+00	-5.240481e+00	-1.006260e+00	5.401150e+00
##					
##	8.042921e+00	1.141714e+01	1.350618e+01	1.377438e+01	2.205113e+00
##					
##	7.105730e-01	-1.491539e-01	-8.134342e-01	-2.360129e+00	-1.991768e+00
##					
##	-1.314502e+00	-1.242878e+00	-6.564500e-01	2.012008e-01	8.532362e-01
##					
##	9.906009e-01	-4.191224e+00	-3.742904e+00	-3.215177e+00	-1.110509e+00
##					
##	2.948408e-01	3.665168e+00	6.747909e+00	9.026711e+00	1.003009e+01
##					

##	1.036026e+01	9.377357e+00	9.400998e+00	6.710476e+00	5.823821e+00
##					
##	5.711951e+00	4.176462e+00	2.011723e+00	2.398073e+00	3.322781e+00
##					
##	4.279261e+00	3.902687e+00	4.161835e+00	2.952516e+00	2.423148e+00
##					
##	-1.386263e+01	-1.239690e+01	-1.001778e+01	-8.391166e+00	-6.567906e+00
##					
##	-5.942547e+00	-3.727585e+00	2.289605e-02	2.226418e+00	4.707286e+00
##					
##	7.045214e+00	7.757067e+00	-8.673344e+00	-8.786145e+00	-9.115734e+00
##					
##	-7.951574e+00	-6.702284e+00	-6.220677e+00	-3.916114e+00	-7.129724e-01
##					
##	2.433369e+00	4.524676e+00	6.013759e+00	8.371813e+00	-5.147897e+00
##					
##	-7.338471e+00	-7.994344e+00	-9.740087e+00	-9.936139e+00	-8.346255e+00
##					
##	-7.283371e+00	-4.237333e+00	-2.323706e+00	-1.295017e+00	2.168367e+00
##					
##	2.999112e+00	-1.588962e+01	-1.221768e+01	-9.668698e+00	-5.159275e+00
##					
##	-4.498074e+00	-3.704917e+00	-2.781429e+00	2.499790e-01	3.661231e+00
##					
##	5.957764e+00	7.900306e+00	1.116427e+01	-1.309282e+01	-1.044078e+01
##					
##	-7.337957e+00	-5.348042e+00	-2.359046e+00	-8.987777e-01	2.832795e+00
##					
##	6.695821e+00	8.435428e+00	9.475383e+00	1.055055e+01	1.100502e+01
##					
##	3.073938e+00	5.360826e+00	6.019786e+00	5.943856e+00	5.380784e+00
##					
##	4.395470e+00	3.946709e+00	1.912273e+00	1.469316e+00	2.678398e+00
##					
##	3.628097e+00	1.953391e+00	1.398524e+00	2.578701e+00	2.182877e+00
##					
##	1.880651e+00	1.386996e+00	3.726277e-01	-8.148631e-01	-9.257477e-01
##					
##	4.878715e-01	1.434339e+00	9.186263e-01	-1.862585e-02	7.045581e+00
##					
##	5.928257e+00	5.152734e+00	3.003216e+00	2.245446e+00	1.990768e+00
##					
##	1.398782e+00	3.671465e-01	2.503147e+00	1.726203e+00	2.361946e+00
##					
##	2.317231e+00	-5.509747e+00	-3.301414e+00	-9.002252e-01	2.143267e+00
##					
##	5.316530e+00	7.859385e+00	9.804429e+00	1.061012e+01	1.074570e+01
##					
##	1.032223e+01	9.865507e+00	8.726711e+00	-8.170011e+00	-6.905880e+00
##					
##	-4.207767e+00	1.789422e-01	1.342339e-01	1.726468e+00	4.375957e+00
##					
##	7.115586e+00	6.958828e+00	7.971571e+00	1.123308e+01	1.147591e+01
##					

##	-1.296238e+01	-1.135357e+01	-1.131178e+01	-1.116750e+01	-1.264977e+01
##					
##	-1.203357e+01	-6.223818e+00	-1.620614e+00	3.361002e-01	1.477834e+00
##					
##	1.912313e+00	1.438406e+00	-1.519609e+01	-1.566317e+01	-1.518924e+01
##					
##	-1.278284e+01	-1.089944e+01	-1.116643e+01	-9.439730e+00	-4.509991e+00
##					
##	-2.038324e-01	8.628750e-01	-4.004337e+00	-1.663448e+00	4.367423e+00
##					
##	5.729906e+00	5.644209e+00	5.182218e+00	3.471873e+00	2.852919e+00
##					
##	2.845012e+00	3.278548e+00	2.331082e+00	7.370938e-02	-1.134443e+00
##					
##	-1.575892e+00	4.965698e+00	5.009376e+00	4.142209e+00	4.049575e+00
##					
##	1.259272e+00	2.341912e+00	2.476650e+00	2.683495e+00	3.552784e+00
##					
##	3.615646e+00	4.631483e+00	4.347740e+00	3.877074e+00	3.682830e+00
##					
##	2.696971e+00	2.813316e+00	2.179605e+00	2.161016e+00	2.366603e+00
##					
##	2.501687e+00	2.332580e+00	2.717448e+00	3.045149e+00	3.165576e+00
##					
##	1.100711e+00	8.618969e-01	3.007672e+00	3.557532e+00	3.358429e+00
##					
##	5.439790e+00	7.338560e+00	7.500851e+00	6.158469e+00	6.994238e+00
##					
##	6.936313e+00	7.058997e+00	4.691879e+00	4.595895e+00	4.156757e+00
##					
##	3.336566e+00	1.786979e+00	2.728255e+00	3.111761e+00	3.420247e+00
##					
##	2.529044e+00	3.234557e+00	4.608940e+00	4.328123e+00	-8.796004e+00
##					
##	-8.013554e+00	-7.466677e+00	-5.315573e+00	1.863709e+00	3.844747e+00
##					
##	3.156345e+00	4.704310e+00	9.113703e+00	1.034374e+01	1.137007e+01
##					
##	1.123267e+01	-4.499303e+00	-2.965674e+00	7.470003e-01	2.022704e+00
##					
##	3.658183e+00	5.937214e+00	8.010633e+00	8.495407e+00	8.570499e+00
##					
##	3.572707e+00	6.383831e-01	2.640779e+00	1.168258e+00	1.991497e+00
##					
##	4.290329e+00	5.143734e+00	4.421245e+00	6.692597e+00	8.633121e+00
##					
##	1.018019e+01	1.035886e+01	1.499769e+01	1.416260e+01	1.508663e+01
##					
##	-9.598611e-01	1.067908e+00	3.397743e+00	3.395585e+00	4.793411e+00
##					
##	3.201863e+00	3.915821e+00	2.966010e+00	2.351657e+00	2.325226e+00
##					
##	3.114550e+00	3.002404e+00	-3.344110e+01	-3.137716e+01	-2.742893e+01
##					

##	-2.183156e+01	-2.137143e+01	-1.439976e+01	-6.882286e+00	-3.067593e+00
##					
##	-3.943732e+00	-4.224052e+00	-2.273846e+00	-4.189688e+00	-5.962430e+00
##					
##	-4.413617e+00	-1.254104e+00	8.675484e-02	-2.819274e-01	-8.734112e-01
##					
##	1.102375e+00	5.108642e+00	4.311888e+00	3.197189e+00	3.420538e+00
##					
##	3.372805e+00	4.519350e+00	6.406673e+00	7.332836e+00	6.409447e+00
##					
##	7.720499e+00	6.620286e+00	8.903434e+00	1.126372e+01	1.173343e+01
##					
##	5.919394e+00	-5.676712e+00	-9.487490e+00	-4.853637e+00	-4.509582e+00
##					
##	-3.677334e+00	-3.671964e+00	-3.623143e+00	-4.991714e-01	1.569617e+00
##					
##	3.814710e+00	-3.410648e+00	-1.607355e+00	1.114261e+00	5.206712e+00
##					
##	-1.301528e+01	-1.365460e+01	-1.700117e+01	-2.349181e+01	-2.192816e+01
##					
##	-1.764066e+01	-1.088377e+01	-3.414593e+00	8.473877e-01	3.805001e+00
##					
##	4.925301e+00	4.093420e+00	-1.466679e+01	-1.332420e+01	-1.163354e+01
##					
##	-9.550842e+00	-8.171442e+00	-5.057889e+00	-1.488049e+00	-5.991329e-02
##					
##	3.716238e+00	6.948202e+00	1.010667e+01	1.091100e+01	-3.205179e+00
##					
##	-3.303378e+00	-2.338575e+00	-2.540749e+00	-1.703654e+00	-8.025734e-01
##					
##	1.481815e+00	3.259507e+00	6.275845e+00	2.551609e+00	4.105585e-01
##					
##	2.553259e+00	-4.961757e+00	-1.221866e+00	1.383746e+00	4.043244e+00
##					
##	5.730708e+00	5.401702e+00	5.956630e+00	6.891532e+00	5.236323e+00
##					
##	3.595701e+00	4.638198e+00	4.101947e+00	-7.547808e+00	-6.629962e+00
##					
##	-5.103348e+00	-4.370891e+00	-3.444000e+00	-3.155008e+00	-3.797739e-02
##					
##	1.523286e+00	2.874948e+00	3.805384e+00	4.102200e+00	5.953288e+00
##					
##	-5.018311e+00	-4.355165e+00	-4.376359e+00	-4.925646e+00	-3.739296e+00
##					
##	-8.189202e-01	2.023757e+00	4.927542e+00	7.493039e+00	8.843073e+00
##					
##	1.011385e+01	1.087351e+01	-3.067078e+00	3.747942e+00	4.005625e+00
##					
##	5.503687e+00	6.545047e+00	5.346222e+00	7.181301e+00	6.942431e+00
##					
##	5.887649e+00	5.104033e+00	4.624392e+00	3.776942e+00	-8.229735e+00
##					
##	-5.329845e+00	-3.122413e+00	-3.299186e+00	-2.515499e+00	-8.878048e-01
##					

##	-4.763509e-01	2.496981e+00	3.700455e+00	5.648126e+00	6.050371e+00
##					
##	6.394410e+00	-3.812794e+00	-2.105262e+00	-3.771394e-01	1.325964e+00
##					
##	2.535693e+00	2.987606e+00	3.292459e+00	4.666541e+00	8.066766e+00
##					
##	9.868003e+00	1.024614e+01	8.799687e+00	2.524300e+00	1.931972e+00
##					
##	2.178155e+00	3.539849e+00	4.599413e+00	5.198466e+00	4.868107e+00
##					
##	5.244661e+00	1.031364e+01	1.102023e+01	9.433589e+00	6.991929e+00
##					
##	-9.843137e+00	-7.051187e+00	-4.138929e+00	-2.498318e+00	-1.022147e+00
##					
##	5.375970e-02	2.830911e+00	5.690389e+00	7.816014e+00	9.982869e+00
##					
##	1.116501e+01	1.132736e+01	-1.025342e+01	-8.250017e+00	-6.881724e+00
##					
##	-5.084699e+00	-5.017125e+00	3.483216e-01	1.373898e+00	2.923873e+00
##					
##	3.888994e+00	4.733779e+00	-1.453941e-01	-4.376854e+00	-2.190674e+00
##					
##	2.908657e+00	5.212934e+00	1.040760e+01	1.390099e+01	1.655459e+01
##					
##	1.738728e+01	1.851161e+01	2.039872e+01	1.984636e+01	1.605355e+01
##					
##	1.442137e+01	-1.414461e+01	-1.132719e+01	-9.832752e+00	-8.616984e+00
##					
##	-5.798857e+00	-3.527224e+00	-1.676632e+00	1.291851e+00	2.198129e+00
##					
##	-1.106890e+00	-8.914957e+00	-8.941504e+00	-6.714572e+00	-5.980004e+00
##					
##	-5.033059e+00	-3.269648e+00	-7.493001e-01	1.781507e+00	4.327953e+00
##					
##	6.602268e+00	8.517480e+00	1.118143e+01	1.270483e+01	1.487260e+01
##					
##	4.878293e+00	3.715557e+00	2.856601e+00	1.848794e+00	2.098096e-02
##					
##	4.572376e-01	1.189310e+00	1.096909e+00	6.000847e-01	1.523908e-01
##					
##	-2.968327e-01	1.747570e-01	6.905528e-01	2.651675e-01	6.081378e-01
##					
##	7.475582e-02	-4.603545e-01	-2.317475e-01	6.676127e-01	4.929750e-01
##					
##	2.803461e+00	2.832704e+00	3.548737e+00	3.923073e+00	-1.573592e+01
##					
##	-1.353466e+01	-1.076987e+01	-9.654210e+00	-6.471676e+00	-5.522787e+00
##					
##	2.988088e-01	4.407571e+00	1.093715e+01	1.319339e+01	1.478564e+01
##					
##	1.593053e+01	-8.334738e+00	-7.985274e+00	-8.643616e+00	-8.493871e+00
##					
##	-7.195419e+00	-5.009883e+00	-4.727124e+00	-8.105764e-02	3.972792e+00
##					

##	7.907967e+00	1.078435e+01	1.288959e+01	-1.247519e+01	-1.118385e+01
##					
##	-1.001578e+01	-7.235759e+00	-9.947584e+00	-9.600871e+00	-6.295849e+00
##					
##	-4.104197e+00	-4.883744e+00	-4.919116e+00	-5.723153e+00	-7.395637e+00
##					
##	4.360020e+00	3.878224e+00	2.658202e+00	1.559687e+00	5.323258e-01
##					
##	-2.368455e-01	-6.881967e-01	-2.353118e+00	-1.568896e+00	-2.270083e+00
##					
##	-2.230309e+00	-1.951610e+00	-1.583293e+01	-1.511275e+01	-1.434247e+01
##					
##	-1.469463e+01	-1.660707e+01	-1.233900e+01	-7.756445e+00	-5.673931e+00
##					
##	-2.449029e+00	-1.641099e+00	2.075067e-02	4.135606e-01	-1.410136e+00
##					
##	-5.074078e-02	1.429195e+00	2.167088e+00	3.353972e+00	4.479897e+00
##					
##	4.807688e+00	5.444144e+00	6.767776e+00	7.411547e+00	9.020980e+00
##					
##	8.981518e+00	-8.798818e-01	1.583430e+00	2.653040e+00	2.960714e+00
##					
##	3.419490e+00	5.904568e+00	5.342851e+00	6.362588e+00	7.833127e+00
##					
##	8.480322e+00	9.162231e+00	7.477812e+00	8.665526e+00	8.803155e+00
##					
##	9.544503e+00	9.540819e+00	9.594401e+00	7.930138e+00	6.090255e+00
##					
##	7.142742e+00	7.569326e+00	8.639019e+00	1.100208e+01	1.114544e+01
##					
##	-1.579277e+01	-1.449358e+01	-1.301213e+01	-1.201459e+01	-8.234281e+00
##					
##	-5.725589e+00	-2.976716e+00	-1.484638e-01	5.297817e+00	4.851037e+00
##					
##	6.266124e+00	5.808782e+00	-2.501946e+00	-6.258472e-01	2.242814e+00
##					
##	3.049596e+00	3.917537e+00	4.374260e+00	5.589469e+00	9.167222e+00
##					
##	1.112419e+01	1.229792e+01	1.365232e+01	1.342194e+01	1.008591e+00
##					
##	4.062822e+00	4.885034e+00	5.062644e+00	4.561405e+00	2.882602e+00
##					
##	4.559749e+00	3.592082e+00	4.997841e+00	4.384779e+00	4.851473e+00
##					
##	3.576669e+00	1.894352e+00	1.778079e+00	2.694429e+00	2.316749e+00
##					
##	1.929975e+00	2.033713e+00	3.133821e+00	3.518854e+00	2.422471e+00
##					
##	2.793351e+00	3.031723e+00	3.607624e+00	6.315677e+00	8.507062e+00
##					
##	7.249702e+00	6.071344e+00	4.733105e+00	5.415246e+00	5.238899e+00
##					
##	4.611033e+00	2.359304e+00	2.063381e+00	4.020792e+00	4.772716e+00
##					

##	-4.147406e+00	-1.942082e+00	-5.541466e-01	2.582533e-01	2.007907e+00
##					
##	6.155636e+00	7.247653e+00	9.216001e+00	9.695977e+00	1.089497e+01
##					
##	1.152313e+01	1.052766e+01	2.910198e+00	3.986617e+00	5.091451e+00
##					
##	2.368145e+00	2.916063e+00	1.812880e+00	1.783943e+00	1.571762e+00
##					
##	4.757954e+00	4.181480e+00	5.166347e+00	3.570936e+00	-1.989112e+00
##					
##	-1.282041e+00	-6.592458e-01	1.804554e+00	1.041925e+00	3.407419e-01
##					
##	-8.330395e-01	-2.692425e+00	-2.189106e+01	-7.461678e+00	-2.633666e+00
##					
##	-6.242942e-01	-5.603639e-01	2.102495e+00	3.140314e+00	3.435993e+00
##					
##	4.604828e+00	5.582591e+00	6.649339e+00	9.946955e+00	1.148065e+01
##					
##	1.261001e+01	1.355022e+01	1.328829e+01	-2.454160e+01	-2.358360e+01
##					
##	-2.362714e+01	-2.290304e+01	-2.227375e+01	-2.025062e+01	-1.580666e+01
##					
##	-8.483322e+00	-7.393223e+00	-3.990068e+00	-2.204396e+00	-2.187127e+00
##					
##	-1.411406e+01	-1.274116e+01	-1.108888e+01	-8.752584e+00	-6.420767e+00
##					
##	-3.158372e+00	5.867241e-01	4.429019e+00	7.314318e+00	9.150724e+00
##					
##	9.801093e+00	1.022141e+01	-1.278011e+00	-4.653391e-01	3.468434e-01
##					
##	6.415379e-01	2.910197e-02	-2.018456e-01	-1.705205e+00	-1.036651e+00
##					
##	4.041125e+00	6.044382e+00	7.806592e+00	5.962970e+00	-1.670239e+01
##					
##	-1.661913e+01	-1.634507e+01	-1.567064e+01	-1.539108e+01	-1.396775e+01
##					
##	-1.303471e+01	-1.039444e+01	-1.039642e+01	-3.422616e+00	-4.021781e+00
##					
##	-4.292759e+00	4.926253e+00	5.918060e+00	6.299808e+00	5.802092e+00
##					
##	2.611180e+00	1.571822e+00	-1.003491e-01	-1.999474e-01	-3.480102e-01
##					
##	-1.615596e+00	-6.316852e-01	-1.775443e+00	2.047390e+00	3.542407e+00
##					
##	4.633221e+00	4.259693e+00	2.411663e+00	1.453302e+00	1.469789e+00
##					
##	1.236063e+00	3.601478e+00	2.801858e+00	2.866932e+00	9.881644e-01
##					
##	4.875701e+00	4.279373e+00	3.545555e+00	1.487250e+00	-2.711861e-01
##					
##	-9.521337e-01	-2.224493e+00	-1.424939e+00	2.346293e+00	2.193847e+00
##					
##	2.105929e+00	1.445448e+00	-1.628203e+01	-1.517543e+01	-1.391081e+01
##					

##	-1.135776e+01	-9.154646e+00	-9.421876e+00	-6.614669e+00	-4.426449e+00
##					
##	-7.830800e+00	-3.727936e+00	-1.120094e+00	6.779095e-01	-1.668167e+01
##					
##	-1.500895e+01	-1.347937e+01	-1.333164e+01	-1.232662e+01	-1.078568e+01
##					
##	-8.718861e+00	-5.255570e+00	-3.505136e+00	-5.458542e+00	-1.259563e+01
##					
##	-1.822691e+01	5.071788e+00	5.270631e+00	6.373564e+00	5.165569e+00
##					
##	4.292941e+00	3.717702e+00	5.185109e+00	4.703723e+00	3.930363e+00
##					
##	4.307024e+00	3.620935e+00	3.484202e+00	8.743365e+00	1.269522e+01
##					
##	1.341558e+01	1.500778e+01	1.520536e+01	1.519008e+01	1.625060e+01
##					
##	1.537161e+01	1.553935e+01	1.376185e+01	1.304111e+01	1.222372e+01
##					
##	-1.369996e+01	-1.350635e+01	-1.314595e+01	-9.857073e+00	-7.484414e+00
##					
##	-7.236792e+00	-3.388195e+00	1.315620e-02	1.915966e+00	2.950964e+00
##					
##	2.203917e+00	2.066412e+00	-7.949432e+00	-6.634793e+00	-8.551226e+00
##					
##	-9.892387e+00	-9.178002e+00	-7.210705e+00	-4.445628e+00	-2.526599e+00
##					
##	-7.305023e-01	-5.675859e+00	-1.664360e+01	-2.167778e+01	5.021370e+00
##					
##	4.340004e+00	3.316950e+00	2.248565e+00	1.449457e+00	1.682737e+00
##					
##	1.862822e+00	1.480681e+00	2.343004e+00	3.080873e+00	2.427118e+00
##					
##	2.022336e+00	-1.986695e+00	-2.748340e+00	-3.136916e+00	-2.706760e+00
##					
##	-3.170472e+00	-1.491968e+00	-1.117770e+00	-4.778584e-01	-3.040228e-01
##					
##	9.641063e-01	1.599816e+00	1.947475e+00	-6.599059e+00	-6.406599e+00
##					
##	-4.692315e+00	-8.315606e-03	9.108069e-01	2.915272e+00	4.887544e+00
##					
##	8.911734e+00	1.058218e+01	1.125831e+01	1.261931e+01	1.351201e+01
##					
##	8.709819e+00	1.066891e+01	1.181463e+01	1.087258e+01	9.017053e+00
##					
##	7.423891e+00	6.527271e+00	4.298641e+00	2.372965e+00	8.893258e-01
##					
##	1.411600e+00	9.743544e-01	-4.030109e+00	-2.047880e+00	-1.064005e+00
##					
##	-9.577628e-01	2.350536e-01	2.102219e+00	3.629743e+00	4.990438e+00
##					
##	3.960034e+00	2.380218e+00	2.428534e+00	3.476733e+00	5.116104e+00
##					
##	7.495836e+00	7.891730e+00	7.877737e+00	8.579031e+00	8.470796e+00
##					

##	8.838029e+00	8.405256e+00	5.809688e+00	3.964739e+00	4.917977e+00
##					
##	4.945731e+00	-8.237097e+00	-6.270899e+00	-4.797943e+00	-4.785300e+00
##					
##	-2.755757e+00	1.013012e+00	4.739256e+00	7.185177e+00	9.616835e+00
##					
##	1.039572e+01	1.046409e+01	1.135513e+01	1.303316e+00	1.346151e+00
##					
##	2.720942e+00	2.195262e+00	1.270062e+00	2.128666e+00	1.408463e+00
##					
##	3.993714e+00	4.294517e+00	2.359813e+00	-4.398830e-01	-3.537415e+00
##					
##	-6.900309e+00	-3.954193e+00	-2.991831e+00	-1.840922e+00	-1.379036e+00
##					
##	1.763264e+00	4.825820e+00	7.079661e+00	9.066604e+00	1.000716e+01
##					
##	9.681188e+00	8.690817e+00	-1.047315e+01	-7.019970e+00	-3.400818e+00
##					
##	-2.873424e+00	-1.944700e+00	-1.298460e+00	2.874351e-01	7.707091e-01
##					
##	2.853325e+00	4.228965e+00	6.363136e+00	5.009793e+00	-5.484634e+00
##					
##	-3.349540e+00	-4.962339e-01	7.335815e-01	3.306378e+00	3.681469e+00
##					
##	5.032602e+00	7.559110e+00	4.509582e+00	-1.805086e+00	3.170475e-01
##					
##	2.913645e+00	9.707123e-01	1.140158e+00	6.030934e-01	1.104874e-01
##					
##	-2.579565e-01	-3.110888e-01	5.758381e-01	3.886543e-02	1.042919e+00
##					
##	6.344237e-01	8.173923e-01	7.340508e-01	-2.715064e+00	-2.183248e+00
##					
##	-2.209153e+00	-3.303782e+00	-3.684798e+00	-2.507044e+00	-1.569971e+00
##					
##	-2.752686e+00	-2.280170e+00	-2.529579e+00	-2.805694e+00	-2.693547e+00
##					
##	2.719531e+00	3.054497e+00	5.076244e+00	5.541822e+00	5.341928e+00
##					
##	5.004157e+00	5.787745e+00	6.254745e+00	6.322435e+00	6.694247e+00
##					
##	9.328236e+00	7.639335e+00	-1.084868e+01	-1.014621e+01	-5.960739e+00
##					
##	-4.338912e+00	-2.944959e+00	-3.154841e+00	-6.211981e-01	2.064929e+00
##					
##	2.305284e+00	3.775707e+00	5.848789e+00	4.365264e+00	-3.357364e+00
##					
##	-1.852626e+00	-5.313567e-01	3.618501e+00	5.220070e+00	1.055685e+01
##					
##	1.368619e+01	1.639175e+01	1.960812e+01	1.967635e+01	1.991566e+01
##					
##	1.831561e+01	-8.615679e+00	-7.734379e+00	-6.893818e+00	-5.015710e+00
##					
##	-1.576680e+00	1.247619e+00	3.464942e+00	4.677661e+00	5.919278e+00
##					

```

## 5.842031e+00 1.107534e+01 1.561933e+01 -1.345487e+01 -1.228694e+01
##
## -1.129934e+01 -9.875762e+00 -1.035212e+01 -9.243242e+00 -4.982515e+00
##
## -1.147836e+00 1.946936e+00 3.328373e+00 5.146118e+00 7.358662e+00
##
## -7.310929e+00 -6.440593e+00 -5.383286e+00 -5.395484e+00 -3.038905e+00
##
## -8.003810e-01 6.831793e-01 9.849416e-01 -3.718575e+00 -8.513080e+00
##
## -9.560197e+00 -7.858503e+00 8.141563e+00 8.041447e+00 9.788607e+00
##
## 1.074933e+01 9.437507e+00 1.281526e+01 1.428088e+01 1.723450e+01
##
## 1.541920e+01 6.872326e-01 -4.695699e+00 1.925590e+00
##
## $rank
## [1] 2
##
## $fitted.values
##      1      2      3      4      5      6      7      8
## 46.86506 47.30012 47.62400 47.45579 46.42835 46.93666 48.77250 47.61705
##      9     10     11     12     13     14     15     16
## 45.33009 45.14689 46.27652 48.74296 52.91535 54.53922 56.00702 57.49308
##     17     18     19     20     21     22     23     24
## 59.02852 59.56785 59.79753 60.04401 56.65226 58.71750 61.79371 63.93059
##     25     26     27     28     29     30     31     32
## 56.48767 58.23238 56.83002 58.85829 60.98662 62.33489 63.65448 63.56061
##     33     34     35     36     37     38     39     40
## 62.52578 62.13899 62.95761 64.32649 59.53831 60.24175 61.15889 63.32267
##     41     42     43     44     45     46     47     48
## 63.24701 58.21750 57.48320 56.42290 57.08007 55.87610 57.53285 62.13888
##     49     50     51     52     53     54     55     56
## 63.89411 65.14126 65.47331 66.49271 67.83113 68.37897 67.42528 67.55668
##     57     58     59     60     61     62     63     64
## 67.71045 69.08886 67.23610 70.37413 68.34602 69.07533 69.99602 71.45096
##     65     66     67     68     69     70     71     72
## 72.66762 73.40782 73.91605 74.89730 75.46729 76.66053 77.73725 78.70568
##     73     74     75     76     77     78     79     80
## 64.20913 67.27894 68.92123 70.41037 72.60379 74.03279 74.78449 75.56115
##     81     82     83     84     85     86     87     88
## 76.67424 77.28954 78.19816 79.10864 68.20034 69.58619 70.35695 71.61060
##     89     90     91     92     93     94     95     96
## 73.37772 73.85676 73.80053 73.49440 73.72337 74.26060 75.45967 77.48940
##     97     98     99    100    101    102    103    104
## 45.77015 45.48777 45.79588 46.21211 45.07905 45.46537 45.68047 46.56354
##    105    106    107    108    109    110    111    112
## 47.47199 48.72734 50.03403 51.73478 66.79023 68.06975 69.10717 70.61381
##    113    114    115    116    117    118    119    120
## 72.60910 73.75967 74.54078 75.13829 76.20562 76.83408 77.68177 78.52240
##    121    122    123    124    125    126    127    128
## 49.47093 48.61278 48.52382 49.25528 49.65124 49.20098 51.02044 50.67099
##    129    130    131    132    133    134    135    136
## 50.43000 50.71966 51.62303 52.03173 57.23687 55.30552 55.51342 56.94803

```

##	137	138	139	140	141	142	143	144
##	58.13802	59.60368	58.62075	57.47325	58.08531	59.06072	59.27804	60.22900
##	145	146	147	148	149	150	151	152
##	48.73393	51.50659	53.46710	55.48014	57.79212	59.55708	60.87323	61.24671
##	153	154	155	156	157	158	159	160
##	56.81671	62.08461	64.04581	65.83441	47.60566	48.24239	48.82086	50.59421
##	161	162	163	164	165	166	167	168
##	55.82601	58.77470	61.69626	64.30285	66.38891	67.09107	69.11665	70.23518
##	169	170	171	172	173	174	175	176
##	55.23115	56.61830	59.08707	59.31882	62.46279	64.89658	65.35187	66.23211
##	177	178	179	180	181	182	183	184
##	65.25501	66.39300	66.57400	67.48847	56.47145	58.21757	61.12943	63.40479
##	185	186	187	188	189	190	191	192
##	64.81717	66.01967	66.66957	66.68556	64.43286	63.97769	66.11249	68.86638
##	193	194	195	196	197	198	199	200
##	43.83080	44.90318	46.22755	47.02931	47.64010	46.46695	47.15913	48.18573
##	201	202	203	204	205	206	207	208
##	48.36524	48.49541	49.26998	50.61027	39.87448	40.81712	40.25957	41.52624
##	209	210	211	212	213	214	215	216
##	42.50716	44.02727	44.08000	44.96607	45.09858	42.48932	42.18041	41.86712
##	217	218	219	220	221	222	223	224
##	40.56776	41.94431	43.08138	43.51837	41.70040	43.54306	45.00190	45.76587
##	225	226	227	228	229	230	231	232
##	45.74627	46.36340	48.03850	53.48721	50.29815	51.24852	51.78510	52.41458
##	233	234	235	236	237	238	239	240
##	53.34061	53.82206	56.20489	56.99914	53.86779	53.39131	54.50334	54.96041
##	241	242	243	244	245	246	247	248
##	69.38986	70.18158	70.81182	72.30336	73.69461	74.97451	75.27641	76.54409
##	249	250	251	252	253	254	255	256
##	76.45408	77.24871	78.43120	79.15337	49.53835	50.42743	50.44312	50.03156
##	257	258	259	260	261	262	263	264
##	49.52816	49.83180	48.58779	47.54258	46.51788	46.43432	46.41368	46.03343
##	265	266	267	268	269	270	271	272
##	50.34104	51.21932	51.72610	50.46944	49.79177	50.01622	47.06183	48.54934
##	273	274	275	276	277	278	279	280
##	49.43377	49.00098	50.17915	53.43942	60.48423	61.24965	61.63687	62.66425
##	281	282	283	284	285	286	287	288
##	63.27880	62.06768	62.64614	63.35955	66.00185	68.41145	68.94314	70.62824
##	289	290	291	292	293	294	295	296
##	41.26730	44.32255	42.92362	44.84198	45.67945	46.44261	48.63744	51.65984
##	297	298	299	300	301	302	303	304
##	53.19785	55.92062	58.52103	62.41783	55.37017	56.04660	56.63513	57.24127
##	305	306	307	308	309	310	311	312
##	58.90390	60.21507	61.40776	62.32256	63.20292	64.18209	63.66924	65.32282
##	313	314	315	316	317	318	319	320
##	49.78329	50.56954	51.82728	54.24750	54.51883	50.29769	50.94912	51.26727
##	321	322	323	324	325	326	327	328
##	50.81410	50.30496	49.57358	48.84214	46.87688	48.12837	48.03933	47.70726
##	329	330	331	332	333	334	335	336
##	48.11942	47.03915	45.64022	45.62807	42.39081	39.17461	37.00508	38.18618
##	337	338	339	340	341	342	343	344
##	55.29735	56.01490	56.54164	57.23879	58.77024	58.88978	62.28181	61.02378
##	345	346	347	348	349	350	351	352
##	60.64536	59.45085	59.45060	59.80141	57.07740	58.16528	59.39462	60.94445

##	353	354	355	356	357	358	359	360
##	62.68314	63.91621	62.91729	63.48416	64.24104	64.91791	66.14157	68.00905
##	361	362	363	364	365	366	367	368
##	51.71871	52.37237	53.56089	55.00129	56.24108	56.72030	56.99929	55.42035
##	369	370	371	372	373	374	375	376
##	53.15862	53.83540	53.16233	52.61443	58.52091	61.29356	63.25408	65.26711
##	377	378	379	380	381	382	383	384
##	67.57910	69.34406	70.66021	71.03369	66.89504	68.20759	69.58083	71.50465
##	385	386	387	388	389	390	391	392
##	63.41915	64.14741	62.78533	63.57378	62.98523	64.53607	65.68709	65.93163
##	393	394	395	396	397	398	399	400
##	63.42863	63.18335	64.48341	67.37863	65.16487	66.70236	68.42706	69.41370
##	401	402	403	404	405	406	407	408
##	70.58783	71.60804	71.92953	72.42474	71.31734	72.28867	73.06250	75.25234
##	409	410	411	412	413	414	415	416
##	68.05019	69.18970	70.88692	72.23018	73.64824	74.31464	74.81982	76.05327
##	417	418	419	420	421	422	423	424
##	76.47443	77.49174	78.13280	78.90898	57.21235	57.80622	58.25191	58.24930
##	425	426	427	428	429	430	431	432
##	59.94287	58.41931	57.84865	57.85050	56.23738	54.33214	54.39068	55.12502
##	433	434	435	436	437	438	439	440
##	51.77374	52.61255	53.23004	53.18738	55.54766	57.25149	57.79484	57.90791
##	441	442	443	444	445	446	447	448
##	58.31628	59.75860	61.71962	64.05474	59.54189	60.13704	60.79033	61.74769
##	449	450	451	452	453	454	455	456
##	62.94640	64.92115	65.56778	64.66844	65.43853	65.81538	63.69517	65.16135
##	457	458	459	460	461	462	463	464
##	51.89971	52.13392	53.38634	53.96898	54.88564	57.56976	59.49791	60.36711
##	465	466	467	468	469	470	471	472
##	60.16857	60.96755	62.06386	63.41109	58.32756	59.29836	60.12871	61.33293
##	473	474	475	476	477	478	479	480
##	61.63901	62.71719	60.81545	60.90135	61.49646	62.74316	63.05798	63.62985
##	481	482	483	484	485	486	487	488
##	40.72983	41.78909	44.42199	48.21822	45.62354	48.60371	48.32974	48.67644
##	489	490	491	492	493	494	495	496
##	50.00190	57.65678	66.11983	69.95247	39.61395	39.99415	40.84875	42.59177
##	497	498	499	500	501	502	503	504
##	43.37083	43.22959	43.54152	43.48138	44.42223	48.19869	46.71168	45.22627
##	505	506	507	508	509	510	511	512
##	40.42228	40.80248	41.65708	43.40010	44.17915	44.03792	44.34984	44.28971
##	513	514	515	516	517	518	519	520
##	41.69501	43.39637	43.62402	45.85037	64.59386	65.94555	67.76752	69.05380
##	521	522	523	524	525	526	527	528
##	71.35362	72.05335	73.49854	74.60510	74.40643	75.57396	77.02803	78.40040
##	529	530	531	532	533	534	535	536
##	65.35064	67.10631	68.77117	70.51794	72.31935	73.38875	74.26138	74.96520
##	537	538	539	540	541	542	543	544
##	75.91413	76.30825	77.24032	77.67740	61.20640	62.44674	64.86033	66.80598
##	545	546	547	548	549	550	551	552
##	69.41554	74.84209	71.78406	69.74972	70.84899	71.56402	70.20293	70.65045
##	553	554	555	556	557	558	559	560
##	42.88140	43.47804	44.66095	46.36910	46.60933	47.93023	47.45189	44.82760
##	561	562	563	564	565	566	567	568
##	45.53826	45.38671	45.47439	46.57215	65.48621	68.46921	70.45470	71.57701

##	569	570	571	572	573	574	575	576
##	73.26075	74.35160	74.95189	75.89211	76.50574	76.90323	77.55676	78.13382
##	577	578	579	580	581	582	583	584
##	48.17868	49.31777	50.42176	49.95456	50.33788	48.90223	47.84695	47.56374
##	585	586	587	588	589	590	591	592
##	48.30465	49.00336	49.85155	51.34121	59.56234	62.34495	64.04332	66.95976
##	593	594	595	596	597	598	599	600
##	70.33818	71.25746	71.86985	72.32630	73.03633	73.59528	75.13406	76.82713
##	601	602	603	604	605	606	607	608
##	56.41608	57.04581	57.46309	58.84674	60.67704	62.28265	62.17954	61.11391
##	609	610	611	612	613	614	615	616
##	61.48742	61.93868	62.24528	62.79392	43.30310	44.32663	45.79627	46.06602
##	617	618	619	620	621	622	623	624
##	46.44747	47.83402	47.66479	47.14218	47.02425	47.78355	48.48909	48.46301
##	625	626	627	628	629	630	631	632
##	38.83569	41.90067	43.49589	46.14653	47.29369	46.70482	47.47513	46.38775
##	633	634	635	636	637	638	639	640
##	46.49126	47.04872	44.31843	44.36976	54.08619	53.55125	53.88384	52.09432
##	641	642	643	644	645	646	647	648
##	53.19111	54.23975	54.83211	54.00657	52.11890	51.43012	50.97075	50.50327
##	649	650	651	652	653	654	655	656
##	55.56703	55.66434	55.92767	56.78857	56.76062	58.74418	58.52771	58.25777
##	657	658	659	660	661	662	663	664
##	58.41913	58.63125	58.46818	59.60423	58.34442	59.79335	61.95362	64.29211
##	665	666	667	668	669	670	671	672
##	66.76280	69.25493	71.47084	74.15492	75.93241	77.07944	77.60509	79.90674
##	673	674	675	676	677	678	679	680
##	62.91879	64.07537	65.95106	67.72689	68.45338	69.61434	70.21921	70.50925
##	681	682	683	684	685	686	687	688
##	68.75136	69.64161	71.63287	73.25738	65.63035	67.65208	68.60208	70.72232
##	689	690	691	692	693	694	695	696
##	72.15647	73.99250	75.41143	76.63723	76.06271	76.98516	77.86647	79.12127
##	697	698	699	700	701	702	703	704
##	43.88186	44.52547	45.44586	45.97075	46.24522	47.22281	47.64980	48.75961
##	705	706	707	708	709	710	711	712
##	50.23873	52.13336	53.64747	56.49866	46.53782	47.68095	47.58637	46.67957
##	713	714	715	716	717	718	719	720
##	49.84492	51.68296	52.46137	53.65510	56.25852	58.52117	57.83241	59.58602
##	721	722	723	724	725	726	727	728
##	58.29170	58.96955	60.99599	63.88759	67.98178	69.76684	66.01535	64.87479
##	729	730	731	732	733	734	735	736
##	65.59322	66.70974	67.64913	69.56443	60.87965	64.33455	66.78885	67.36299
##	737	738	739	740	741	742	743	744
##	67.94869	71.54424	71.44620	69.59180	60.05907	58.40424	61.39464	61.54705
##	745	746	747	748	749	750	751	752
##	62.83310	63.43800	64.86050	66.06737	67.90886	69.22847	70.26753	71.06421
##	753	754	755	756	757	758	759	760
##	73.04462	75.85203	78.61777	80.10558	60.79117	63.11076	65.44081	66.84108
##	761	762	763	764	765	766	767	768
##	70.37910	70.71394	71.92396	72.83312	73.27722	74.50737	74.90371	76.18842
##	769	770	771	772	773	774	775	776
##	62.37073	64.36058	66.68936	68.33161	70.03175	71.29318	72.54094	73.79882
##	777	778	779	780	781	782	783	784
##	74.94507	75.90433	76.95726	77.13615	57.90411	62.06726	62.89069	64.19217

##	785	786	787	788	789	790	791	792
##	65.82039	64.88404	64.11406	64.49744	65.78758	65.46006	65.30864	65.69164
##	793	794	795	796	797	798	799	800
##	58.78018	61.25368	64.79057	68.18389	71.59590	72.57790	73.87586	75.08227
##	801	802	803	804	805	806	807	808
##	76.60648	77.20846	77.14640	77.99836	52.62617	54.29241	56.13369	57.43686
##	809	810	811	812	813	814	815	816
##	55.23877	57.76912	60.94382	61.50487	59.32306	59.83103	60.27895	61.63755
##	817	818	819	820	821	822	823	824
##	47.62834	48.47890	48.04544	49.42322	50.64698	50.95253	51.47073	51.55578
##	825	826	827	828	829	830	831	832
##	51.43134	51.54681	51.08346	52.15886	49.67042	52.75678	53.02300	55.36791
##	833	834	835	836	837	838	839	840
##	59.95971	60.83175	60.83221	60.83215	60.01503	53.37353	53.15191	52.87329
##	841	842	843	844	845	846	847	848
##	49.21266	52.29754	52.56857	54.90729	58.27938	61.88992	63.47374	66.97947
##	849	850	851	852	853	854	855	856
##	69.91796	72.25982	73.81052	75.43975	88.34280	88.73230	87.27554	85.88418
##	857	858	859	860	861	862	863	864
##	88.41734	83.26916	77.91778	77.00232	78.82626	80.02766	78.86878	81.37492
##	865	866	867	868	869	870	871	872
##	62.20445	64.14412	63.60959	64.02905	65.87954	67.10327	66.05083	63.09797
##	873	874	875	876	877	878	879	880
##	65.18278	67.19523	67.71543	68.69166	38.80750	39.79235	41.50226	43.11051
##	881	882	883	884	885	886	887	888
##	43.07576	46.48934	47.05504	46.80606	48.76799	50.39422	51.00258	52.74713
##	889	890	891	892	893	894	895	896
##	44.31650	44.95459	45.13172	46.12327	47.11536	45.21253	44.26710	43.23557
##	897	898	899	900	901	902	903	904
##	45.16383	44.79339	43.64665	41.55732	56.27405	59.36384	65.01800	73.60651
##	905	906	907	908	909	910	911	912
##	74.55345	74.92119	72.95098	69.68299	68.00476	67.85283	67.91230	69.88541
##	913	914	915	916	917	918	919	920
##	52.04180	52.85289	53.13469	53.08678	53.65609	52.61160	51.18317	50.17377
##	921	922	923	924	925	926	927	928
##	49.29450	48.84340	48.02358	49.32750	40.58362	41.59500	41.82461	43.05768
##	929	930	931	932	933	934	935	936
##	44.44762	45.50789	45.11326	45.14922	44.13385	45.86824	45.53572	46.64552
##	937	938	939	940	941	942	943	944
##	54.04391	53.94665	54.93894	55.87832	57.75952	60.24171	62.35188	62.89661
##	945	946	947	948	949	950	951	952
##	65.64216	68.42378	68.48499	70.15577	42.29139	42.97017	43.06886	43.85790
##	953	954	955	956	957	958	959	960
##	44.40072	45.79653	44.91448	45.76926	46.41736	46.98086	48.54072	49.30987
##	961	962	963	964	965	966	967	968
##	46.46388	47.55494	49.41653	51.91346	52.84045	52.35329	52.26106	51.91617
##	969	970	971	972	973	974	975	976
##	51.55228	52.27232	52.79886	53.91448	54.64958	54.92718	56.75804	56.57772
##	977	978	979	980	981	982	983	984
##	56.91091	59.98094	59.92881	62.11494	64.10048	65.81114	67.44759	69.08097
##	985	986	987	988	989	990	991	992
##	59.43626	60.88327	61.75234	63.66847	65.08290	66.08860	67.97945	67.13084
##	993	994	995	996	997	998	999	1000
##	67.85721	68.11490	68.91475	69.82951	46.94151	48.19125	49.42018	50.67226

##	1001	1002	1003	1004	1005	1006	1007	1008
##	51.91699	53.15575	54.78788	56.09781	53.83133	54.36417	55.35692	58.45744
##	1009	1010	1011	1012	1013	1014	1015	1016
##	57.14298	59.91563	61.87615	63.88918	66.20117	67.96613	69.28228	69.65576
##	1017	1018	1019	1020	1021	1022	1023	1024
##	65.31893	64.64745	64.76567	67.66107	53.36083	53.12760	52.73117	53.47379
##	1025	1026	1027	1028	1029	1030	1031	1032
##	54.48674	56.21424	57.31590	57.47738	58.04648	58.14302	58.88802	60.22468
##	1033	1034	1035	1036	1037	1038	1039	1040
##	42.58695	43.05890	44.03607	44.18546	46.25549	43.17232	42.47290	41.04241
##	1041	1042	1043	1044	1045	1046	1047	1048
##	41.48379	42.65520	45.12406	47.32908	39.66641	40.13554	41.00187	40.11149
##	1049	1050	1051	1052	1053	1054	1055	1056
##	40.30198	40.62529	41.74763	40.93663	40.06318	41.56730	44.81855	48.47500
##	1057	1058	1059	1060	1061	1062	1063	1064
##	56.40064	57.05959	58.66511	60.16622	60.06006	60.34767	61.00356	59.94178
##	1065	1066	1067	1068	1069	1070	1071	1072
##	60.19021	60.39748	60.76192	62.16308	43.87109	44.63689	45.36955	45.67376
##	1073	1074	1075	1076	1077	1078	1079	1080
##	45.65319	45.89051	46.17926	46.82385	48.05269	49.05044	49.42695	49.69419
##	1081	1082	1083	1084	1085	1086	1087	1088
##	67.37250	69.32233	70.38167	71.92189	73.61635	74.63211	74.70723	75.54819
##	1089	1090	1091	1092	1093	1094	1095	1096
##	76.59584	77.61541	78.53042	79.26342	68.76806	70.01675	70.63082	71.41489
##	1097	1098	1099	1100	1101	1102	1103	1104
##	72.28737	72.38511	73.07978	73.71082	73.42117	74.56900	75.38255	76.07628
##	1105	1106	1107	1108	1109	1110	1111	1112
##	58.50237	59.38607	59.80559	61.86493	61.94635	63.26708	59.41742	58.06908
##	1113	1114	1115	1116	1117	1118	1119	1120
##	55.47162	55.78660	56.57488	57.45990	46.67347	47.44901	48.94058	49.40449
##	1121	1122	1123	1124	1125	1126	1127	1128
##	48.56542	47.17680	48.16412	45.57198	44.39802	44.38532	44.68089	44.93707
##	1129	1130	1131	1132	1133	1134	1135	1136
##	49.58506	49.76500	50.14087	49.08050	53.41139	54.70915	52.78796	51.69710
##	1137	1138	1139	1140	1141	1142	1143	1144
##	53.01343	53.03981	52.98972	54.84388	68.39263	69.59930	70.80427	72.45121
##	1145	1146	1147	1148	1149	1150	1151	1152
##	73.69217	75.42649	76.43995	77.96775	78.59025	80.23012	80.89547	81.73151
##	1153	1154	1155	1156	1157	1158	1159	1160
##	54.03058	55.74818	57.97947	62.00414	68.81685	69.73833	70.48872	73.30683
##	1161	1162	1163	1164	1165	1166	1167	1168
##	73.53635	74.01261	74.04360	75.05980	45.77449	46.50864	47.11889	48.46082
##	1169	1170	1171	1172	1173	1174	1175	1176
##	49.36898	50.32144	52.04423	53.44250	54.66611	54.99022	55.16621	57.00974
##	1177	1178	1179	1180	1181	1182	1183	1184
##	56.59466	58.08560	59.57625	61.45243	63.07788	63.05852	65.32644	65.35658
##	1185	1186	1187	1188	1189	1190	1191	1192
##	64.84420	65.45034	65.73190	68.15087	54.58249	54.97710	55.38549	55.95777
##	1193	1194	1195	1196	1197	1198	1199	1200
##	56.73898	58.86187	61.13766	60.60894	61.01420	61.11571	60.14399	60.96686
##	1201	1202	1203	1204	1205	1206	1207	1208
##	60.08793	61.11147	62.41431	63.71705	63.93172	64.40436	64.60691	64.51027
##	1209	1210	1211	1212	1213	1214	1215	1216
##	61.50053	63.78971	63.89085	65.79210	50.98738	52.63180	53.16616	53.96549

##	1217	1218	1219	1220	1221	1222	1223	1224
##	54.74057	56.22340	57.00111	55.54674	55.88415	56.78282	57.15356	58.71072
##	1225	1226	1227	1228	1229	1230	1231	1232
##	60.67271	62.02781	63.03783	64.76562	66.44410	67.88888	66.89875	67.50380
##	1233	1234	1235	1236	1237	1238	1239	1240
##	66.15835	68.44588	69.84680	71.93647	58.38257	60.12375	62.01662	64.51103
##	1241	1242	1243	1244	1245	1246	1247	1248
##	67.44799	68.45654	69.67103	70.54337	72.37141	73.08389	74.12653	74.35026
##	1249	1250	1251	1252	1253	1254	1255	1256
##	58.41986	60.41391	62.66703	65.22957	67.54137	68.11768	68.58650	70.04002
##	1257	1258	1259	1260	1261	1262	1263	1264
##	71.51750	72.77250	73.64352	73.85181	57.36633	57.52122	58.66646	60.65568
##	1265	1266	1267	1268	1269	1270	1271	1272
##	62.56658	61.25779	62.92445	62.98195	64.15993	64.11945	64.45090	66.08333
##	1273	1274	1275	1276	1277	1278	1279	1280
##	58.58901	60.49146	62.02913	64.65428	66.44925	67.75366	67.97434	68.05356
##	1281	1282	1283	1284	1285	1286	1287	1288
##	64.81834	65.72106	66.31595	68.96626	43.02044	43.78479	44.63037	43.31573
##	1289	1290	1291	1292	1293	1294	1295	1296
##	44.53285	45.59434	47.89992	47.57351	46.39521	44.52379	46.93175	47.72183
##	1297	1298	1299	1300	1301	1302	1303	1304
##	47.88095	47.69890	49.54023	51.69595	52.55018	53.60305	54.31083	52.45944
##	1305	1306	1307	1308	1309	1310	1311	1312
##	51.95848	51.41350	51.50102	52.90158	64.63957	66.60122	69.57941	72.72471
##	1313	1314	1315	1316	1317	1318	1319	1320
##	75.95947	78.64011	78.52255	74.62783	75.96089	74.38178	73.71407	74.80694
##	1321	1322	1323	1324	1325	1326	1327	1328
##	52.08447	52.73814	53.19381	52.97471	52.89777	52.70653	52.47027	52.03427
##	1329	1330	1331	1332	1333	1334	1335	1336
##	51.59249	51.74152	52.47666	53.48080	59.68234	62.45500	64.41551	66.42855
##	1337	1338	1339	1340	1341	1342	1343	1344
##	68.74054	70.50549	71.82164	72.19512	67.72547	66.34676	65.59371	68.13144
##	1345	1346	1347	1348	1349	1350	1351	1352
##	47.88290	48.99699	49.88666	50.53403	51.50516	51.47110	52.16897	51.12860
##	1353	1354	1355	1356	1357	1358	1359	1360
##	49.51781	44.30299	45.95537	47.71650	56.01519	57.74183	59.89844	62.44880
##	1361	1362	1363	1364	1365	1366	1367	1368
##	67.04293	69.27291	71.81503	73.64616	75.93658	78.47910	79.08455	81.34576
##	1369	1370	1371	1372	1373	1374	1375	1376
##	62.61142	64.14891	65.87361	66.86025	68.03438	69.05459	69.37609	69.87129
##	1377	1378	1379	1380	1381	1382	1383	1384
##	67.88032	69.93319	70.92117	73.56412	61.05144	63.82409	65.78461	67.79764
##	1385	1386	1387	1388	1389	1390	1391	1392
##	70.10963	71.87459	73.19074	73.56422	71.26881	72.85206	74.41166	76.26871
##	1393	1394	1395	1396	1397	1398	1399	1400
##	50.02929	50.88953	51.60225	51.06528	50.86564	52.08816	50.32777	49.70870
##	1401	1402	1403	1404	1405	1406	1407	1408
##	48.32190	48.35481	47.90479	48.31447	62.01189	63.26820	63.68889	65.45127
##	1409	1410	1411	1412	1413	1414	1415	1416
##	66.18771	66.46731	67.01405	66.25225	65.58091	65.87146	66.12795	67.67537
##	1417	1418	1419	1420	1421	1422	1423	1424
##	60.25512	61.72145	63.57906	66.43044	68.83323	70.66980	71.09644	72.13885
##	1425	1426	1427	1428	1429	1430	1431	1432
##	73.53019	74.32385	75.95881	77.20977	49.63369	49.54804	49.56311	50.02755

##	1433	1434	1435	1436	1437	1438	1439	1440
##	50.58511	51.47416	53.15865	54.25081	55.40781	57.19643	58.23629	60.54823
##	1441	1442	1443	1444	1445	1446	1447	1448
##	52.99339	53.76011	54.61379	53.35980	53.21747	55.59784	54.33448	52.41105
##	1449	1450	1451	1452	1453	1454	1455	1456
##	52.32351	53.07733	54.75755	56.99827	50.12222	50.79926	54.15811	57.03278
##	1457	1458	1459	1460	1461	1462	1463	1464
##	59.15794	60.13896	60.38855	60.57939	59.61534	60.34829	60.87629	61.62642
##	1465	1466	1467	1468	1469	1470	1471	1472
##	66.97431	68.23841	70.07287	71.86427	73.17440	73.64357	74.41466	75.52527
##	1473	1474	1475	1476	1477	1478	1479	1480
##	75.62907	76.10346	77.36022	78.56400	71.57052	73.21083	74.31801	75.30109
##	1481	1482	1483	1484	1485	1486	1487	1488
##	76.72169	76.65565	77.08539	77.62529	78.05537	78.12465	78.71680	79.42371
##	1489	1490	1491	1492	1493	1494	1495	1496
##	53.13519	55.26413	55.55979	54.27387	56.89764	58.72389	60.09534	58.51427
##	1497	1498	1499	1500	1501	1502	1503	1504
##	59.09703	60.64117	60.80022	60.99041	50.54033	52.41128	54.00594	57.13114
##	1505	1506	1507	1508	1509	1510	1511	1512
##	60.74167	63.43416	65.81187	69.15548	71.84075	74.22524	75.39907	77.17974
##	1513	1514	1515	1516	1517	1518	1519	1520
##	46.15908	45.94390	46.22164	47.57576	48.22179	48.63806	47.82976	47.41170
##	1521	1522	1523	1524	1525	1526	1527	1528
##	47.34943	46.96945	48.06517	49.81745	46.62832	47.01609	48.97784	51.13517
##	1529	1530	1531	1532	1533	1534	1535	1536
##	52.50275	54.62079	56.29399	58.14457	61.81683	63.81024	63.89677	65.84806
##	1537	1538	1539	1540	1541	1542	1543	1544
##	47.68983	48.31236	49.50867	52.24087	53.16671	52.54903	51.44796	50.50721
##	1545	1546	1547	1548	1549	1550	1551	1552
##	49.24283	48.80917	47.94414	47.91325	58.25826	60.81965	62.48268	63.47139
##	1553	1554	1555	1556	1557	1558	1559	1560
##	64.84522	66.33106	67.53813	65.76903	65.74898	67.23126	69.45867	73.25717
##	1561	1562	1563	1564	1565	1566	1567	1568
##	52.18882	51.75879	53.22076	54.49616	57.47201	58.52533	59.63238	60.20319
##	1569	1570	1571	1572	1573	1574	1575	1576
##	61.28288	62.27715	63.62184	65.42576	54.65447	55.65778	56.04322	57.69217
##	1577	1578	1579	1580	1581	1582	1583	1584
##	59.36972	61.15859	61.10375	62.63521	63.55616	64.82218	64.70249	66.90546
##	1585	1586	1587	1588	1589	1590	1591	1592
##	46.36876	46.81017	46.73275	48.15670	48.53476	47.53120	45.74582	44.91054
##	1593	1594	1595	1596	1597	1598	1599	1600
##	45.26290	47.25604	48.32880	49.42038	68.29556	69.32753	70.17298	71.22621
##	1601	1602	1603	1604	1605	1606	1607	1608
##	72.20795	72.98213	73.36104	74.81080	75.20501	76.36802	77.39948	78.39944
##	1609	1610	1611	1612	1613	1614	1615	1616
##	71.13517	71.63467	72.35369	73.93904	74.86542	75.69659	76.01752	77.51427
##	1617	1618	1619	1620	1621	1622	1623	1624
##	78.09022	79.02469	79.77283	80.56313	63.61283	64.22787	63.44442	63.20287
##	1625	1626	1627	1628	1629	1630	1631	1632
##	63.59317	64.69765	65.21858	65.84130	66.57999	67.63956	66.14543	68.81164
##	1633	1634	1635	1636	1637	1638	1639	1640
##	66.10487	68.14511	66.87031	67.91829	68.72710	70.61056	69.22955	68.21438
##	1641	1642	1643	1644	1645	1646	1647	1648
##	68.90809	68.45077	67.05006	69.42575	44.73652	45.67182	46.78493	45.17043

```

##      1649      1650      1651      1652      1653      1654      1655      1656
## 45.95551 46.12249 46.04793 47.29957 48.86661 51.70236 53.73215 56.46213
##      1657      1658      1659      1660      1661      1662      1663      1664
## 52.45427 54.02523 55.58244 57.14973 58.55901 59.91694 61.28930 62.66514
##      1665      1666      1667      1668      1669      1670      1671      1672
## 64.04397 65.44676 61.63016 58.26403 46.88953 47.13444 47.34883 47.71554
##      1673      1674      1675      1676      1677      1678      1679      1680
## 50.93549 54.03763 54.69049 54.66574 54.26302 55.26512 55.71842 55.88948
##      1681      1682      1683      1684      1685      1686      1687      1688
## 50.11499 51.24153 52.09819 53.79205 53.77511 52.85017 51.83940 50.58456
##      1689      1690      1691      1692      1693      1694      1695      1696
## 50.56770 49.53869 49.54073 50.97635 41.40130 43.44308 43.57980 44.23170
##      1697      1698      1699      1700      1701      1702      1703      1704
## 47.07714 45.78664 46.96592 46.03511 45.88213 47.00414 45.61887 42.60815
##
## $assign
## [1] 0 1
##
## $qr
## $qr
##      (Intercept) log(gdpPercap)
## 1      -41.27953488 -3.367911e+02
## 2         0.02422508  5.121963e+01
## 3         0.02422508  2.683405e-02
## 4         0.02422508  2.722478e-02
## 5         0.02422508  2.961136e-02
## 6         0.02422508  2.843064e-02
## 7         0.02422508  2.416625e-02
## 8         0.02422508  2.685018e-02
## 9         0.02422508  3.216246e-02
## 10        0.02422508  3.258800e-02
## 11        0.02422508  2.996404e-02
## 12        0.02422508  2.423486e-02
## 13        0.02422508  1.454303e-02
## 14        0.02422508  1.077102e-02
## 15        0.02422508  7.361532e-03
## 16        0.02422508  3.909639e-03
## 17        0.02422508  3.430471e-04
## 18        0.02422508 -9.097329e-04
## 19        0.02422508 -1.443254e-03
## 20        0.02422508 -2.015788e-03
## 21        0.02422508  5.862732e-03
## 22        0.02422508  1.065495e-03
## 23        0.02422508 -6.080075e-03
## 24        0.02422508 -1.104375e-02
## 25        0.02422508  6.245051e-03
## 26        0.02422508  2.192366e-03
## 27        0.02422508  5.449837e-03
## 28        0.02422508  7.384539e-04
## 29        0.02422508 -4.205341e-03
## 30        0.02422508 -7.337159e-03
## 31        0.02422508 -1.040237e-02
## 32        0.02422508 -1.018434e-02
## 33        0.02422508 -7.780576e-03

```

## 34	0.02422508	-6.882126e-03
## 35	0.02422508	-8.783653e-03
## 36	0.02422508	-1.196336e-02
## 37	0.02422508	-8.411239e-04
## 38	0.02422508	-2.475118e-03
## 39	0.02422508	-4.605503e-03
## 40	0.02422508	-9.631628e-03
## 41	0.02422508	-9.455892e-03
## 42	0.02422508	2.226914e-03
## 43	0.02422508	3.932593e-03
## 44	0.02422508	6.395504e-03
## 45	0.02422508	4.868991e-03
## 46	0.02422508	7.665648e-03
## 47	0.02422508	3.817266e-03
## 48	0.02422508	-6.881867e-03
## 49	0.02422508	-1.095900e-02
## 50	0.02422508	-1.385595e-02
## 51	0.02422508	-1.462726e-02
## 52	0.02422508	-1.699518e-02
## 53	0.02422508	-2.010412e-02
## 54	0.02422508	-2.137666e-02
## 55	0.02422508	-1.916138e-02
## 56	0.02422508	-1.946660e-02
## 57	0.02422508	-1.982379e-02
## 58	0.02422508	-2.302563e-02
## 59	0.02422508	-1.872195e-02
## 60	0.02422508	-2.601113e-02
## 61	0.02422508	-2.130013e-02
## 62	0.02422508	-2.299422e-02
## 63	0.02422508	-2.513284e-02
## 64	0.02422508	-2.851244e-02
## 65	0.02422508	-3.133856e-02
## 66	0.02422508	-3.305795e-02
## 67	0.02422508	-3.423849e-02
## 68	0.02422508	-3.651778e-02
## 69	0.02422508	-3.784177e-02
## 70	0.02422508	-4.061350e-02
## 71	0.02422508	-4.311455e-02
## 72	0.02422508	-4.536409e-02
## 73	0.02422508	-1.169076e-02
## 74	0.02422508	-1.882147e-02
## 75	0.02422508	-2.263625e-02
## 76	0.02422508	-2.609532e-02
## 77	0.02422508	-3.119031e-02
## 78	0.02422508	-3.450966e-02
## 79	0.02422508	-3.625575e-02
## 80	0.02422508	-3.805980e-02
## 81	0.02422508	-4.064535e-02
## 82	0.02422508	-4.207461e-02
## 83	0.02422508	-4.418520e-02
## 84	0.02422508	-4.630011e-02
## 85	0.02422508	-2.096173e-02
## 86	0.02422508	-2.418085e-02
## 87	0.02422508	-2.597121e-02

## 88	0.02422508	-2.888327e-02
## 89	0.02422508	-3.298803e-02
## 90	0.02422508	-3.410077e-02
## 91	0.02422508	-3.397015e-02
## 92	0.02422508	-3.325905e-02
## 93	0.02422508	-3.379090e-02
## 94	0.02422508	-3.503882e-02
## 95	0.02422508	-3.782409e-02
## 96	0.02422508	-4.253884e-02
## 97	0.02422508	3.114026e-02
## 98	0.02422508	3.179621e-02
## 99	0.02422508	3.108051e-02
## 100	0.02422508	3.011366e-02
## 101	0.02422508	3.274559e-02
## 102	0.02422508	3.184822e-02
## 103	0.02422508	3.134859e-02
## 104	0.02422508	2.929734e-02
## 105	0.02422508	2.718716e-02
## 106	0.02422508	2.427116e-02
## 107	0.02422508	2.123591e-02
## 108	0.02422508	1.728531e-02
## 109	0.02422508	-1.768625e-02
## 110	0.02422508	-2.065838e-02
## 111	0.02422508	-2.306817e-02
## 112	0.02422508	-2.656787e-02
## 113	0.02422508	-3.120263e-02
## 114	0.02422508	-3.387523e-02
## 115	0.02422508	-3.568964e-02
## 116	0.02422508	-3.707755e-02
## 117	0.02422508	-3.955682e-02
## 118	0.02422508	-4.101663e-02
## 119	0.02422508	-4.298570e-02
## 120	0.02422508	-4.493836e-02
## 121	0.02422508	2.254390e-02
## 122	0.02422508	2.453727e-02
## 123	0.02422508	2.474389e-02
## 124	0.02422508	2.304484e-02
## 125	0.02422508	2.212508e-02
## 126	0.02422508	2.317096e-02
## 127	0.02422508	1.894461e-02
## 128	0.02422508	1.975635e-02
## 129	0.02422508	2.031613e-02
## 130	0.02422508	1.964329e-02
## 131	0.02422508	1.754490e-02
## 132	0.02422508	1.659554e-02
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## 1654 0.02422508 1.736063e-02
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## 1698 0.02422508 3.110197e-02
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## 1700 0.02422508 3.052481e-02
## 1701 0.02422508 3.088017e-02
## 1702 0.02422508 2.827389e-02
## 1703 0.02422508 3.149167e-02
## 1704 0.02422508 3.848512e-02
## attr("assign")
## [1] 0 1
##

```

```

## $qraux
## [1] 1.024225 1.027586
##
## $pivot
## [1] 1 2
##
## $tol
## [1] 1e-07
##
## $rank
## [1] 2
##
## attr("class")
## [1] "qr"
##
## $df.residual
## [1] 1702
##
## $xlevels
## named list()
##
## $call
## lm(formula = lifeExp ~ log(gdpPercap), data = gapminder)
##
## $terms
## lifeExp ~ log(gdpPercap)
## attr("variables")
## list(lifeExp, log(gdpPercap))
## attr("factors")
##          log(gdpPercap)
## lifeExp                0
## log(gdpPercap)          1
## attr("term.labels")
## [1] "log(gdpPercap)"
## attr("order")
## [1] 1
## attr("intercept")
## [1] 1
## attr("response")
## [1] 1
## attr(".Environment")
## <environment: R_GlobalEnv>
## attr("predvars")
## list(lifeExp, log(gdpPercap))
## attr("dataClasses")
##      lifeExp log(gdpPercap)
##      "numeric"      "numeric"
##
## $model
##      lifeExp log(gdpPercap)
## 1      28.80100      6.658583
## 2      30.33200      6.710344
## 3      31.99700      6.748878
## 4      34.02000      6.728864

```

## 5	36.08800	6.606625
## 6	38.43800	6.667101
## 7	39.85400	6.885521
## 8	40.82200	6.748051
## 9	41.67400	6.475959
## 10	41.76300	6.454162
## 11	42.12900	6.588561
## 12	43.82800	6.882007
## 13	55.23000	7.378419
## 14	59.28000	7.571620
## 15	64.82000	7.746253
## 16	66.22000	7.923057
## 17	67.69000	8.105737
## 18	68.93000	8.169904
## 19	70.42000	8.197231
## 20	72.00000	8.226555
## 21	71.58100	7.823021
## 22	72.95000	8.068733
## 23	75.65100	8.434727
## 24	76.42300	8.688964
## 25	43.07700	7.803438
## 26	45.68500	8.011015
## 27	48.30300	7.844169
## 28	51.40700	8.085484
## 29	54.51800	8.338704
## 30	58.01400	8.499114
## 31	61.36800	8.656113
## 32	65.79900	8.644946
## 33	67.74400	8.521826
## 34	69.15200	8.475808
## 35	70.99400	8.573203
## 36	72.30100	8.736066
## 37	30.01500	8.166390
## 38	31.99900	8.250082
## 39	34.00000	8.359200
## 40	35.98500	8.616636
## 41	37.92800	8.607635
## 42	39.48300	8.009246
## 43	39.94200	7.921882
## 44	39.90600	7.795732
## 45	40.64700	7.873920
## 46	40.96300	7.730676
## 47	41.00300	7.927789
## 48	42.73100	8.475794
## 49	62.48500	8.684624
## 50	64.39900	8.833004
## 51	65.14200	8.872510
## 52	65.63400	8.993794
## 53	67.06500	9.153033
## 54	68.48100	9.218212
## 55	69.94200	9.104746
## 56	70.77400	9.120380
## 57	71.86800	9.138675
## 58	73.27500	9.302672

## 59	74.34000	9.082239
## 60	75.32000	9.455588
## 61	69.12000	9.214292
## 62	70.33000	9.301063
## 63	70.93000	9.410602
## 64	71.10000	9.583704
## 65	71.93000	9.728457
## 66	73.49000	9.816523
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## 68	76.32000	9.993734
## 69	77.56000	10.061549
## 70	78.83000	10.203516
## 71	80.37000	10.331619
## 72	81.23500	10.446839
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## 74	67.48000	9.087336
## 75	69.54000	9.282728
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## 77	70.63000	9.720863
## 78	72.17000	9.890880
## 79	73.18000	9.980314
## 80	74.94000	10.072717
## 81	76.04000	10.205147
## 82	77.51000	10.278353
## 83	78.98000	10.386457
## 84	79.82900	10.494782
## 85	50.93900	9.196960
## 86	53.83200	9.361842
## 87	56.92300	9.453543
## 88	59.92300	9.602698
## 89	63.30000	9.812942
## 90	65.59300	9.869936
## 91	69.05200	9.863246
## 92	70.75000	9.826824
## 93	72.60100	9.854065
## 94	73.92500	9.917983
## 95	74.79500	10.060643
## 96	75.63500	10.302131
## 97	37.48400	6.528315
## 98	39.34800	6.494718
## 99	41.21600	6.531375
## 100	43.45300	6.580897
## 101	45.25200	6.446091
## 102	46.92300	6.492054
## 103	50.00900	6.517644
## 104	52.81900	6.622709
## 105	56.01800	6.730792
## 106	59.41200	6.880148
## 107	62.01300	7.035612
## 108	64.06200	7.237961
## 109	68.00000	9.029191
## 110	69.24000	9.181422
## 111	70.25000	9.304851
## 112	70.94000	9.484104

## 113	71.44000	9.721495
## 114	72.80000	9.858384
## 115	73.93000	9.951318
## 116	75.35000	10.022406
## 117	76.46000	10.149393
## 118	77.53000	10.224164
## 119	78.32000	10.325019
## 120	79.44100	10.425034
## 121	38.22300	6.968617
## 122	40.35800	6.866518
## 123	42.61800	6.855935
## 124	44.88500	6.942960
## 125	47.01400	6.990069
## 126	49.19000	6.936499
## 127	50.90400	7.152972
## 128	52.33700	7.111395
## 129	53.91900	7.082723
## 130	54.77700	7.117185
## 131	54.40600	7.224664
## 132	56.72800	7.273290
## 133	40.41400	7.892574
## 134	41.89000	7.662790
## 135	43.42800	7.687526
## 136	45.03200	7.858210
## 137	46.71400	7.999790
## 138	50.02300	8.174167
## 139	53.85900	8.057222
## 140	57.25100	7.920698
## 141	59.95700	7.993519
## 142	62.05000	8.109569
## 143	63.88300	8.135424
## 144	65.55400	8.248565
## 145	53.82000	6.880932
## 146	58.45000	7.210810
## 147	61.93000	7.444064
## 148	64.79000	7.683566
## 149	67.45000	7.958636
## 150	69.86000	8.168623
## 151	70.69000	8.325212
## 152	71.14000	8.369647
## 153	72.17800	7.842586
## 154	73.24400	8.469337
## 155	74.09000	8.702672
## 156	74.85200	8.915472
## 157	47.62200	6.746695
## 158	49.61800	6.822451
## 159	51.52000	6.891274
## 160	53.29800	7.102260
## 161	56.02400	7.724717
## 162	59.31900	8.075538
## 163	61.48400	8.423134
## 164	63.62200	8.733253
## 165	62.74500	8.981444
## 166	52.55600	9.064984

## 167	46.63400	9.305978
## 168	50.72800	9.439057
## 169	50.91700	7.653943
## 170	53.28500	7.818980
## 171	55.66500	8.112703
## 172	57.63200	8.140276
## 173	59.50400	8.514331
## 174	61.48900	8.803893
## 175	63.33600	8.858061
## 176	65.20500	8.962788
## 177	67.05700	8.846538
## 178	69.38800	8.981931
## 179	71.00600	9.003465
## 180	72.39000	9.112264
## 181	59.60000	7.801509
## 182	66.61000	8.009254
## 183	69.51000	8.355694
## 184	70.42000	8.626407
## 185	70.90000	8.794445
## 186	70.81000	8.937513
## 187	71.08000	9.014835
## 188	71.34000	9.016738
## 189	71.19000	8.748721
## 190	70.32000	8.694567
## 191	72.14000	8.948557
## 192	73.00500	9.276202
## 193	31.97500	6.297579
## 194	34.90600	6.425166
## 195	37.81400	6.582734
## 196	40.69700	6.678124
## 197	43.59100	6.750793
## 198	46.13700	6.611217
## 199	48.12200	6.693570
## 200	49.55700	6.815709
## 201	50.26000	6.837068
## 202	50.32400	6.852554
## 203	50.65000	6.944709
## 204	52.29500	7.104171
## 205	39.03100	5.826874
## 206	40.53300	5.939025
## 207	42.04500	5.872690
## 208	43.54800	6.023393
## 209	44.05700	6.140099
## 210	45.91000	6.320954
## 211	47.47100	6.327228
## 212	48.21100	6.432649
## 213	44.73600	6.448414
## 214	45.32600	6.137976
## 215	47.36000	6.101223
## 216	49.58000	6.063950
## 217	39.41700	5.909357
## 218	41.36600	6.073133
## 219	43.41500	6.208416
## 220	45.41500	6.260408

## 221	40.31700	6.044114
## 222	31.22000	6.263345
## 223	50.95700	6.436912
## 224	53.91400	6.527805
## 225	55.80300	6.525474
## 226	56.53400	6.598897
## 227	56.75200	6.798193
## 228	59.72300	7.446456
## 229	38.52300	7.067036
## 230	40.42800	7.180107
## 231	42.64300	7.243947
## 232	44.79900	7.318840
## 233	47.04900	7.429014
## 234	49.35500	7.486295
## 235	52.96100	7.769794
## 236	54.98500	7.864291
## 237	54.31400	7.491737
## 238	52.19900	7.435047
## 239	49.85600	7.567352
## 240	50.43000	7.621732
## 241	68.75000	9.338484
## 242	69.96000	9.432680
## 243	71.30000	9.507662
## 244	72.13000	9.685119
## 245	72.88000	9.850644
## 246	74.21000	10.002920
## 247	75.76000	10.038839
## 248	76.86000	10.189663
## 249	77.95000	10.178953
## 250	78.61000	10.273496
## 251	79.77000	10.414182
## 252	80.65300	10.500103
## 253	35.46300	6.976638
## 254	37.46400	7.082418
## 255	39.47500	7.084284
## 256	41.47800	7.035318
## 257	43.45700	6.975426
## 258	46.77500	7.011551
## 259	48.29500	6.863545
## 260	50.48500	6.739190
## 261	49.39600	6.617277
## 262	46.06600	6.607334
## 263	43.30800	6.604879
## 264	44.74100	6.559639
## 265	38.09200	7.072139
## 266	39.88100	7.176633
## 267	41.71600	7.236928
## 268	43.60100	7.087415
## 269	45.56900	7.006789
## 270	47.38300	7.033493
## 271	49.51700	6.681993
## 272	51.05100	6.858971
## 273	51.72400	6.964196
## 274	51.57300	6.912704

## 275	50.52500	7.052878
## 276	50.65100	7.440771
## 277	54.74500	8.278931
## 278	56.07400	8.369997
## 279	57.92400	8.416067
## 280	60.52300	8.538300
## 281	63.44100	8.611416
## 282	67.05200	8.467323
## 283	70.56500	8.536146
## 284	72.49200	8.621024
## 285	74.12600	8.935394
## 286	75.81600	9.222077
## 287	77.86000	9.285335
## 288	78.55300	9.485821
## 289	44.00000	5.992585
## 290	50.54896	6.356085
## 291	44.50136	6.189647
## 292	58.38112	6.417885
## 293	63.11888	6.517524
## 294	63.96736	6.608321
## 295	65.52500	6.869452
## 296	67.27400	7.229044
## 297	68.69000	7.412030
## 298	70.42600	7.735973
## 299	72.02800	8.045358
## 300	72.96100	8.508983
## 301	50.64300	7.670482
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## 306	63.83700	8.246908
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## 308	67.76800	8.497647
## 309	68.42100	8.602389
## 310	70.31300	8.718886
## 311	71.68200	8.657869
## 312	72.88900	8.854605
## 313	40.71500	7.005781
## 314	42.46000	7.099324
## 315	44.46700	7.248965
## 316	46.47200	7.536913
## 317	48.94400	7.569194
## 318	50.93900	7.066981
## 319	52.93300	7.144486
## 320	54.92600	7.182338
## 321	57.93900	7.128422
## 322	60.66000	7.067847
## 323	62.97400	6.980831
## 324	65.15200	6.893806
## 325	39.14300	6.659989
## 326	40.65200	6.808885
## 327	42.12200	6.798292
## 328	44.05600	6.758783

## 329	45.98900	6.807820
## 330	47.80400	6.679294
## 331	47.78400	6.512856
## 332	47.41200	6.511411
## 333	45.54800	6.126256
## 334	42.58700	5.743607
## 335	44.96600	5.485485
## 336	46.46200	5.626008
## 337	42.11100	7.661819
## 338	45.05300	7.747189
## 339	48.43500	7.809859
## 340	52.04000	7.892803
## 341	54.90700	8.075008
## 342	55.62500	8.089231
## 343	56.69500	8.492800
## 344	57.47000	8.343124
## 345	56.43300	8.298101
## 346	52.96200	8.155984
## 347	52.97000	8.155954
## 348	55.32200	8.197692
## 349	57.20600	7.873601
## 350	60.02600	8.003032
## 351	62.84200	8.149295
## 352	65.42400	8.333686
## 353	67.84900	8.540548
## 354	70.75000	8.687253
## 355	73.45000	8.568406
## 356	74.75200	8.635850
## 357	75.71300	8.725900
## 358	77.26000	8.806431
## 359	78.12300	8.952016
## 360	78.78200	9.174201
## 361	40.47700	7.236048
## 362	42.46900	7.313817
## 363	44.93000	7.455223
## 364	47.35000	7.626595
## 365	49.80100	7.774100
## 366	52.37400	7.831116
## 367	53.98300	7.864309
## 368	54.65500	7.676453
## 369	52.04400	7.407362
## 370	47.99100	7.487882
## 371	46.83200	7.407804
## 372	48.32800	7.342617
## 373	61.21000	8.045344
## 374	64.77000	8.375222
## 375	67.13000	8.608475
## 376	68.50000	8.847978
## 377	69.61000	9.123048
## 378	70.64000	9.333034
## 379	70.46000	9.489624
## 380	71.52000	9.534059
## 381	72.52700	9.041661
## 382	73.68000	9.197823

## 383	74.87600	9.361205
## 384	75.74800	9.590093
## 385	59.42100	8.628115
## 386	62.32500	8.714760
## 387	65.24600	8.552706
## 388	68.29000	8.646513
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## 390	72.64900	8.761001
## 391	73.71700	8.897944
## 392	74.17400	8.927039
## 393	74.41400	8.629243
## 394	76.15100	8.600061
## 395	77.15800	8.754736
## 396	78.27300	9.099197
## 397	66.87000	8.835813
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## 400	70.38000	9.341320
## 401	70.29000	9.481013
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## 405	72.40000	9.567806
## 406	74.01000	9.683372
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## 415	74.63000	9.984516
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## 427	48.81200	7.965361
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## 432	54.79100	7.641316
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## 436	56.75100	7.410784

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## 446	51.35600	8.237624
## 447	54.64000	8.315350
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## 450	61.31000	8.806817
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## 458	44.44400	7.285448
## 459	46.99200	7.434456
## 460	49.29300	7.503775
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## 462	53.31900	7.932180
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## 465	63.67400	8.241375
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## 468	71.33800	8.627156
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## 472	55.85500	8.379905
## 473	58.20700	8.416322
## 474	56.69600	8.544599
## 475	56.60400	8.318338
## 476	63.15400	8.328558
## 477	66.79800	8.399362
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## 479	70.73400	8.585145
## 480	71.87800	8.653183
## 481	34.48200	5.928640
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## 571	73.80000	10.000230
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## 583	53.74400	6.775403
## 584	55.72900	6.741708
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## 587	58.45300	7.013902
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## 591	69.51000	8.702376
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## 617	38.84200	6.608899
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## 619	42.89100	6.753730
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## 622	51.45500	6.767861
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## 625	32.50000	5.703283
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## 628	35.49200	6.573094
## 629	36.48600	6.709578
## 630	37.46500	6.639518
## 631	39.32700	6.731166
## 632	41.24500	6.601794
## 633	43.26600	6.614109
## 634	44.87300	6.680434
## 635	45.50400	6.355595
## 636	46.38800	6.361703
## 637	37.57900	7.517720
## 638	40.69600	7.454076
## 639	43.59000	7.493645
## 640	46.24300	7.280737
## 641	48.04200	7.411228
## 642	49.92300	7.535990
## 643	51.46100	7.606467
## 644	53.63600	7.508248
## 645	55.08900	7.283661
## 646	56.67100	7.201713
## 647	58.13700	7.147059
## 648	60.91600	7.091440
## 649	41.91200	7.693904
## 650	44.66500	7.705482
## 651	48.04100	7.736812
## 652	50.92400	7.839238

## 653	53.88400	7.835912
## 654	57.40200	8.071908
## 655	60.90900	8.046152
## 656	64.49200	8.014037
## 657	66.39900	8.033235
## 658	67.65900	8.058471
## 659	68.56500	8.039070
## 660	70.19800	8.174233
## 661	60.96000	8.024345
## 662	64.75000	8.196733
## 663	67.65000	8.453752
## 664	70.00000	8.731976
## 665	72.00000	9.025928
## 666	73.60000	9.322431
## 667	75.45000	9.586070
## 668	76.20000	9.905409
## 669	77.60100	10.116888
## 670	80.00000	10.253357
## 671	81.49500	10.315896
## 672	82.20800	10.589735
## 673	64.03000	8.568585
## 674	66.41000	8.706189
## 675	67.96000	8.929351
## 676	69.50000	9.140631
## 677	69.76000	9.227065
## 678	69.95000	9.365191
## 679	69.39000	9.437156
## 680	69.58000	9.471664
## 681	69.17000	9.262518
## 682	71.04000	9.368436
## 683	72.59000	9.605347
## 684	73.33800	9.798624
## 685	72.49000	8.891194
## 686	73.47000	9.131730
## 687	73.68000	9.244757
## 688	73.73000	9.497014
## 689	74.46000	9.667643
## 690	76.11000	9.886085
## 691	76.99000	10.054903
## 692	77.23000	10.200744
## 693	78.77000	10.132390
## 694	78.95000	10.242140
## 695	80.50000	10.346993
## 696	81.75700	10.496284
## 697	37.37300	6.303655
## 698	40.24900	6.380228
## 699	43.60500	6.489732
## 700	47.19300	6.552181
## 701	50.65100	6.584836
## 702	54.20800	6.701146
## 703	56.59600	6.751947
## 704	58.55300	6.883988
## 705	60.22300	7.059967
## 706	61.76500	7.285381

## 707	62.87900	7.465523
## 708	64.69800	7.804745
## 709	37.46800	6.619649
## 710	39.91800	6.755653
## 711	42.51800	6.744400
## 712	45.96400	6.636513
## 713	49.20300	7.013113
## 714	52.70200	7.231795
## 715	56.15900	7.324406
## 716	60.13700	7.466432
## 717	62.68100	7.776175
## 718	66.04100	8.045375
## 719	68.58800	7.963430
## 720	70.65000	8.172066
## 721	44.86900	8.018074
## 722	47.18100	8.098721
## 723	49.32500	8.339819
## 724	52.46900	8.683848
## 725	55.23400	9.170957
## 726	57.70200	9.383335
## 727	59.62000	8.937000
## 728	63.04000	8.801301
## 729	65.74200	8.886776
## 730	68.04200	9.019614
## 731	69.45100	9.131380
## 732	70.96400	9.359253
## 733	45.32000	8.325976
## 734	48.43700	8.737025
## 735	51.45700	9.029027
## 736	54.45900	9.097335
## 737	56.95000	9.167019
## 738	60.41300	9.594802
## 739	62.03800	9.583138
## 740	65.04400	9.362510
## 741	59.46100	8.228348
## 742	58.81100	8.031463
## 743	57.04600	8.387248
## 744	59.54500	8.405381
## 745	66.91000	8.558389
## 746	68.90000	8.630357
## 747	70.29000	8.799601
## 748	71.08000	8.943189
## 749	71.28000	9.162281
## 750	72.03000	9.319283
## 751	73.10000	9.442905
## 752	74.36000	9.537690
## 753	75.46700	9.773311
## 754	76.12200	10.107324
## 755	77.78300	10.436379
## 756	78.88500	10.613393
## 757	65.39000	8.315450
## 758	67.84000	8.591424
## 759	69.39000	8.868643
## 760	70.75000	9.035242

## 761	71.63000	9.456179
## 762	73.06000	9.496017
## 763	74.45000	9.639980
## 764	75.60000	9.748147
## 765	76.93000	9.800985
## 766	78.26900	9.947342
## 767	79.69600	9.994497
## 768	80.74500	10.147346
## 769	65.94000	8.503379
## 770	67.81000	8.740122
## 771	69.24000	9.017190
## 772	71.06000	9.212578
## 773	72.19000	9.414853
## 774	73.48000	9.564932
## 775	74.98000	9.713385
## 776	76.42000	9.863042
## 777	77.44000	9.999418
## 778	78.82000	10.113547
## 779	80.24000	10.238820
## 780	80.54600	10.260103
## 781	58.53000	7.971959
## 782	62.61000	8.467273
## 783	65.61000	8.565242
## 784	67.51000	8.720086
## 785	69.00000	8.913804
## 786	70.11000	8.802402
## 787	71.21000	8.710793
## 788	71.77000	8.756405
## 789	71.76600	8.909900
## 790	72.26200	8.870933
## 791	72.04700	8.852919
## 792	72.56700	8.898486
## 793	63.03000	8.076191
## 794	65.50000	8.370477
## 795	68.73000	8.791281
## 796	71.43000	9.195002
## 797	73.42000	9.600948
## 798	75.38000	9.717783
## 799	77.11000	9.872209
## 800	78.67000	10.015742
## 801	79.36000	10.197086
## 802	80.69000	10.268706
## 803	82.00000	10.261323
## 804	82.60300	10.362685
## 805	43.15800	7.344013
## 806	45.66900	7.542256
## 807	48.12600	7.761323
## 808	51.62900	7.916369
## 809	56.52800	7.654849
## 810	61.13400	7.955899
## 811	63.73900	8.333611
## 812	65.86900	8.400363
## 813	68.01500	8.140780
## 814	69.77200	8.201216

## 815	71.26300	8.254507
## 816	72.53500	8.416148
## 817	42.27000	6.749393
## 818	44.68600	6.850590
## 819	47.94900	6.799018
## 820	50.65400	6.962941
## 821	53.55900	7.108539
## 822	56.15500	7.144891
## 823	58.76600	7.206545
## 824	59.33900	7.216663
## 825	59.28500	7.201858
## 826	54.40700	7.215597
## 827	50.99200	7.160469
## 828	54.11000	7.288415
## 829	50.05600	6.992352
## 830	54.08100	7.359553
## 831	56.65600	7.391226
## 832	59.94200	7.670214
## 833	63.98300	8.216526
## 834	67.15900	8.320278
## 835	69.10000	8.320333
## 836	70.64700	8.320324
## 837	69.97800	8.223108
## 838	67.72700	7.432932
## 839	66.66200	7.406564
## 840	67.29700	7.373415
## 841	47.45300	6.937889
## 842	52.68100	7.304915
## 843	55.29200	7.337161
## 844	57.71600	7.615411
## 845	62.61200	8.016607
## 846	64.76600	8.446174
## 847	67.12300	8.634610
## 848	69.81000	9.051707
## 849	72.24400	9.401314
## 850	74.64700	9.679939
## 851	77.04500	9.864434
## 852	78.62300	10.058273
## 853	55.56500	11.593421
## 854	58.03300	11.639762
## 855	60.47000	11.466443
## 856	64.62400	11.300906
## 857	67.71200	11.602290
## 858	69.34300	10.989782
## 859	71.30900	10.353098
## 860	74.17400	10.244181
## 861	75.19000	10.461185
## 862	76.15600	10.604122
## 863	76.90400	10.466244
## 864	77.58800	10.764413
## 865	55.92800	8.483596
## 866	59.48900	8.714368
## 867	62.09400	8.650773
## 868	63.87000	8.700678

## 869	65.42100	8.920841
## 870	66.09900	9.066435
## 871	66.98300	8.941221
## 872	67.92600	8.589903
## 873	69.29200	8.837943
## 874	70.26500	9.077376
## 875	71.02800	9.139267
## 876	71.99300	9.255415
## 877	42.13800	5.699929
## 878	45.04700	5.817103
## 879	47.74700	6.020539
## 880	48.49200	6.211882
## 881	49.76700	6.207748
## 882	52.20800	6.613880
## 883	55.07800	6.681185
## 884	57.18000	6.651563
## 885	59.68500	6.884984
## 886	55.55800	7.078466
## 887	44.59300	7.150846
## 888	42.59200	7.358405
## 889	38.48000	6.355366
## 890	39.48600	6.431283
## 891	40.50200	6.452357
## 892	41.53600	6.570328
## 893	42.61400	6.688362
## 894	43.76400	6.461972
## 895	44.85200	6.349488
## 896	46.02700	6.226762
## 897	40.80200	6.456178
## 898	42.22100	6.412104
## 899	43.75300	6.275670
## 900	45.67800	6.027091
## 901	42.72300	7.778022
## 902	45.28900	8.145632
## 903	47.80800	8.818339
## 904	50.22700	9.840162
## 905	52.77300	9.952825
## 906	57.44200	9.996578
## 907	62.15500	9.762170
## 908	66.23400	9.373359
## 909	68.75500	9.173691
## 910	71.55500	9.155614
## 911	72.73700	9.162691
## 912	73.95200	9.397442
## 913	36.68100	7.274488
## 914	38.86500	7.370988
## 915	40.84800	7.404515
## 916	42.88100	7.398815
## 917	44.85100	7.466550
## 918	46.88100	7.342280
## 919	48.96900	7.172331
## 920	49.35000	7.052238
## 921	52.21400	6.947626
## 922	54.97800	6.893956

## 923	57.28600	6.796418
## 924	59.44300	6.951552
## 925	36.25600	5.911244
## 926	37.20700	6.031574
## 927	38.41000	6.058892
## 928	39.48700	6.205597
## 929	41.76600	6.370965
## 930	43.76700	6.497112
## 931	45.64200	6.450161
## 932	47.45700	6.454439
## 933	49.42000	6.333635
## 934	47.49500	6.539984
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## 938	52.10200	7.501119
## 939	55.73700	7.619177
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## 948	74.24100	9.429609
## 949	33.68500	6.114427
## 950	35.30700	6.195185
## 951	36.93600	6.206927
## 952	38.48700	6.300804
## 953	39.97700	6.365385
## 954	41.71400	6.531454
## 955	43.91600	6.426511
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## 957	48.38800	6.605317
## 958	49.90300	6.672359
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## 962	42.33800	6.740662
## 963	44.24800	6.962145
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## 982	70.73600	8.912703
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## 986	55.19000	8.326407
## 987	58.29900	8.429806
## 988	60.11000	8.657778
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## 990	65.03200	8.945714
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## 993	71.45500	9.156136
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## 1008	66.80300	8.037793
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## 1035	36.16100	6.322002
## 1036	38.11300	6.339776
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## 1178	59.20100	7.993553
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## 1683 46.02300      7.281197
## 1684 47.76800      7.482725
## 1685 50.10700      7.480709
## 1686 51.38600      7.370664
## 1687 51.82100      7.250407
## 1688 50.82100      7.101112
## 1689 46.10000      7.099106
## 1690 40.23800      6.976678
## 1691 39.19300      6.976921
## 1692 42.38400      7.147726
## 1693 48.45100      6.008528
## 1694 50.46900      6.251450
## 1695 52.35800      6.267717
## 1696 53.99500      6.345277
## 1697 55.63500      6.683814
## 1698 57.67400      6.530276
## 1699 60.36300      6.670583
## 1700 62.35100      6.559838
## 1701 60.37700      6.541637
## 1702 46.80900      6.675129
## 1703 39.98900      6.510316
## 1704 43.48700      6.152114
```

```
names(my_lm)
```

```
## [1] "coefficients" "residuals"    "effects"      "rank"
## [5] "fitted.values" "assign"        "qr"           "df.residual"
## [9] "xlevels"      "call"         "terms"        "model"
```

```
my_lm$coefficients
```

```
##      (Intercept) log(gdpPercap)
##      -9.100889      8.405085
```

To complicate things further, some info is stored in *another* list after applying the `summary` function:

```
summary(my_lm) %>%
  names()
```

```
## [1] "call"          "terms"         "residuals"     "coefficients"
## [5] "aliased"       "sigma"         "df"            "r.squared"
## [9] "adj.r.squared" "fstatistic"    "cov.unscaled"
```

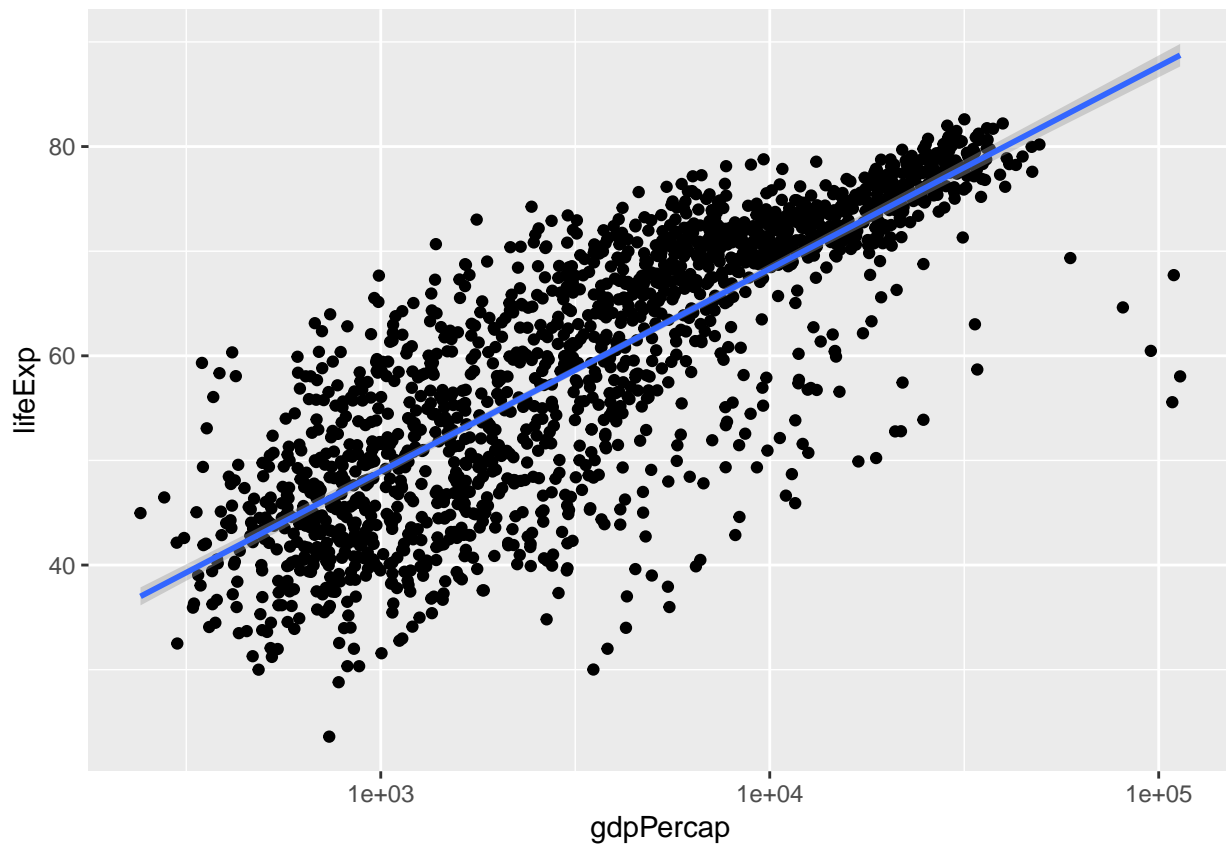
We can use the `predict()` function to make predictions from the model (default is to use fitting/training data). Here are the predictions:

```
predict(my_lm, new_data = tibble(gdpPercap = c(500, 600, 700))) %>%
  head()
```

```
##      1      2      3      4      5      6
## 46.86506 47.30012 47.62400 47.45579 46.42835 46.93666
```

We can plot models (with one predictor/ X variable) using `ggplot2` through the `geom_smooth()` layer. Specifying `method="lm"` gives us the linear regression fit (but only visually!):

```
ggplot(gapminder, aes(gdpPercap, lifeExp)) +
  geom_point() +
  geom_smooth(method="lm") +
  scale_x_log10()
```



Broom

Let's make it easier to extract info, using the **broom** package. There are three crown functions in this package, all of which input a fitted model, and outputs a tidy data frame.

1. **tidy**: extract statistical summaries about each component of the model.
 - Useful for *interpretation* task.
2. **augment**: add columns to the original data frame, giving information corresponding to each row.
 - Useful for *prediction* task.
3. **glance**: extract statistical summaries about the model as a whole (1-row tibble).
 - Useful for checking goodness of fit.

Exercise: apply all three functions to our fitted model, `my_lm`. What do you see?