

# Lab6

## Exercises

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## Contents

<b>Exercise 1</b>	<b>1</b>
A . . . . .	1
B . . . . .	2
C . . . . .	3
<b>Exercise 2</b>	<b>4</b>
A . . . . .	4
B . . . . .	5
C . . . . .	6
<b>Exercise 3</b>	<b>6</b>
A . . . . .	6
B . . . . .	7
C . . . . .	38
<b>Exercise 4</b>	<b>39</b>
A . . . . .	39
B . . . . .	40
C . . . . .	40
D . . . . .	41
E . . . . .	41
F . . . . .	41
G . . . . .	42

## Exercise 1

### A

Compare the PDF's and the CDF's of the following Uniform continuous random variables (hint: see page 3 of the slides).

Calculate: 1.  $X_1 \sim U(0, 1)$

```
a <- 0
b <- 1
seq <- seq(a - 0.5, b + 0.5, 0.01)
x1 <- data.frame(
  x = seq,
  pdf = dunif(seq, a, b),
  cdf = punif(seq, a, b)
)
```

2.  $X2 \sim U(-3, 2)$

```
a <- -3
b <- 2
seq <- seq(a - 0.5, b + 0.5, 0.01)
x2 <- data.frame(
  x = seq,
  pdf = dunif(seq, a, b),
  cdf = punif(seq, a, b)
)
```

3.  $X3 \sim U(2, 4)$

```
a <- 2
b <- 4
seq <- seq(a - 0.5, b + 0.5, 0.01)
x3 <- data.frame(
  x = seq,
  pdf = dunif(seq, a, b),
  cdf = punif(seq, a, b)
)
```

4.  $X4 \sim U(0.8, 2.5)$

```
a <- 0.8
b <- 2.5
seq <- seq(a - 0.5, b + 0.5, 0.01)
x4 <- data.frame(
  x = seq,
  pdf = dunif(seq, a, b),
  cdf = punif(seq, a, b)
)
```

## B

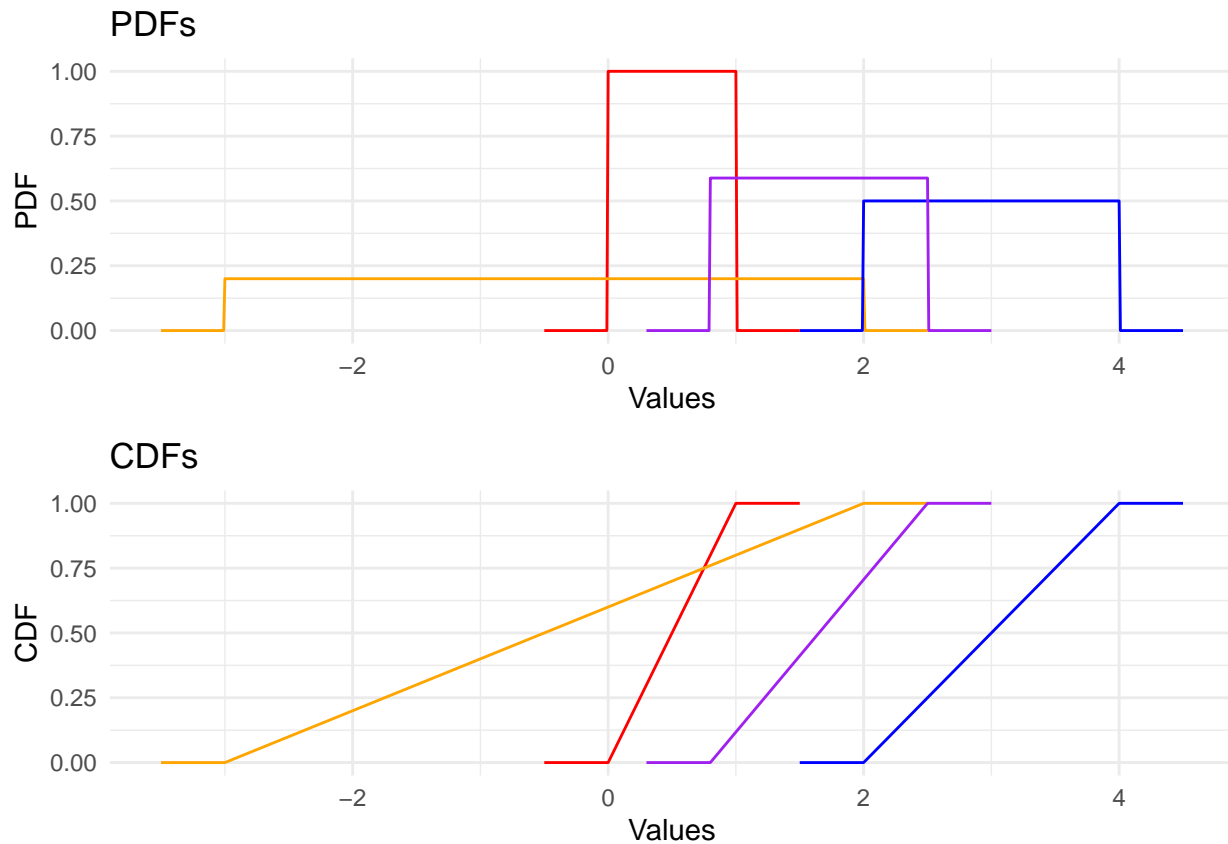
Create a new figure with two vertical panels: first row PDFs, second row CDFs (hint: use the library `cowplot` and the `plot_grid()` function to arrange multiple ggplot objects).

```
library(ggplot2)
library(cowplot)

pdfs <- ggplot() +
  geom_line(data = x1, aes(x = x, y = pdf), color = "red") +
  geom_line(data = x2, aes(x = x, y = pdf), color = "orange") +
  geom_line(data = x3, aes(x = x, y = pdf), color = "blue") +
  geom_line(data = x4, aes(x = x, y = pdf), color = "purple") +
  labs(title = "PDFs", x = "Values", y = "PDF") +
  theme_minimal()

cdfs <- ggplot() +
  geom_line(data = x1, aes(x = x, y = cdf), color = "red") +
  geom_line(data = x2, aes(x = x, y = cdf), color = "orange") +
  geom_line(data = x3, aes(x = x, y = cdf), color = "blue") +
  geom_line(data = x4, aes(x = x, y = cdf), color = "purple") +
  labs(title = "CDFs", x = "Values", y = "CDF") +
  theme_minimal()
```

```
plot_grid(pdf, cdf, ncol = 1)
```



## C

Determine the mean and variance of each random variable.

```
x1_mean <- mean(runif(1000000, 0, 1))
x1_var <- var(runif(1000000, 0, 1))

x2_mean <- mean(runif(1000000, -3, 2))
x2_var <- var(runif(1000000, -3, 2))

x3_mean <- mean(runif(1000000, 2, 4))
x3_var <- var(runif(1000000, 2, 4))

x4_mean <- mean(runif(1000000, 0.8, 2.5))
x4_var <- var(runif(1000000, 0.8, 2.5))

table <- data.frame(
  x = c("X1", "X2", "X3", "X4"),
  mean = c(x1_mean, x2_mean, x3_mean, x4_mean),
  var = c(x1_var, x2_var, x3_var, x4_var)
)
table
```

```
##      x      mean      var
## 1 X1  0.5005719 0.0832618
```

```
## 2 X2 -0.4968930 2.0848360
## 3 X3  2.9996687 0.3336598
## 4 X4  1.6500830 0.2406394
```

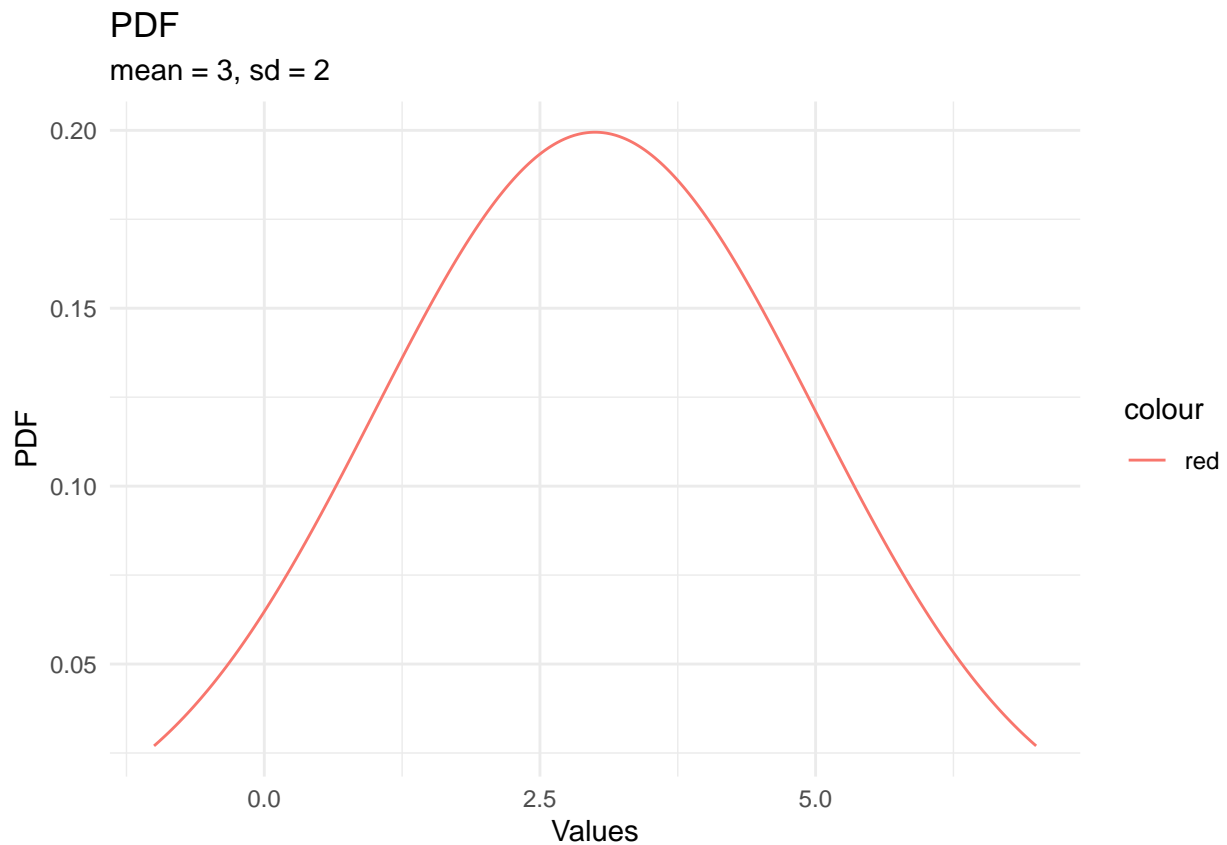
## Exercise 2

### A

Determine and plot the values of the PDF for a normal distribution with mean 3 and sd 2 for  $x$  values between -1 and 7.

```
mu <- 3
sd <- 2
seq <- seq(-1, 7, 0.01)
normal <- data.frame(
  x = seq,
  pdf = dnorm(seq, mu, sd)
)

ggplot(normal, aes(x = x, y = pdf)) +
  geom_line(aes(y = pdf, color = "red")) +
  labs(
    title = "PDF",
    subtitle = "mean = 3, sd = 2",
    x = "Values",
    y = "PDF"
  ) +
  theme_minimal()
```

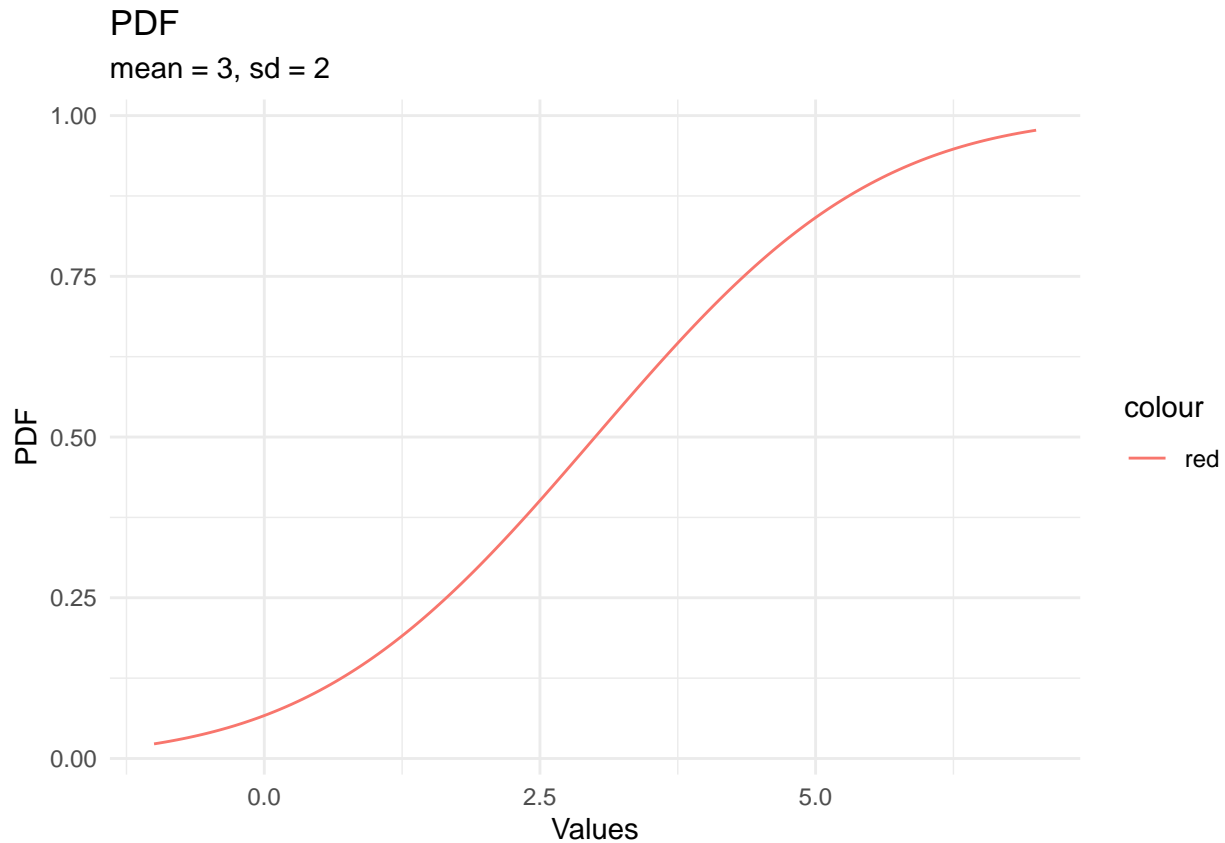


## B

Determine and plot the corresponding values of the CDF

```
mu <- 3
sd <- 2
seq <- seq(-1, 7, 0.01)
normal <- data.frame(
  x = seq,
  pdf = pnorm(seq, mu, sd)
)

ggplot(normal, aes(x = x, y = pdf)) +
  geom_line(aes(y = pdf, color = "red")) +
  labs(
    title = "PDF",
    subtitle = "mean = 3, sd = 2",
    x = "Values",
    y = "PDF"
  ) +
  theme_minimal()
```



## C

Determine for what values of  $x$  the value of the CDF equals 0.025 and 0.975 (hint: remember all the prefixes: p, d, r, q. See Lab 4, slide 2).

```
qnorm(0.025, mu, sd)
```

```
## [1] -0.919928
```

```
qnorm(0.975, mu, sd)
```

```
## [1] 6.919928
```

## Exercise 3

### A

Create a set of values ranging from  $x_{\min}$  to  $x_{\max}$ .

```
mu <- 100 # the mean
sigma <- 15 # the standard deviation
xmin <- 70 # minimum x value for pdf and cdf plots
xmax <- 130 # maximum x value for pdf and cdf plots
n <- 100 # number of points of pdf and cdf plots
k <- 10000 # number of random draws (for histogram)

seq <- seq(xmin, xmax, length = n)
seq
```

```
## [1] 70.00000 70.60606 71.21212 71.81818 72.42424 73.03030
## [7] 73.63636 74.24242 74.84848 75.45455 76.06061 76.66667
## [13] 77.27273 77.87879 78.48485 79.09091 79.69697 80.30303
## [19] 80.90909 81.51515 82.12121 82.72727 83.33333 83.93939
## [25] 84.54545 85.15152 85.75758 86.36364 86.96970 87.57576
## [31] 88.18182 88.78788 89.39394 90.00000 90.60606 91.21212
## [37] 91.81818 92.42424 93.03030 93.63636 94.24242 94.84848
## [43] 95.45455 96.06061 96.66667 97.27273 97.87879 98.48485
## [49] 99.09091 99.69697 100.30303 100.90909 101.51515 102.12121
## [55] 102.72727 103.33333 103.93939 104.54545 105.15152 105.75758
## [61] 106.36364 106.96970 107.57576 108.18182 108.78788 109.39394
## [67] 110.00000 110.60606 111.21212 111.81818 112.42424 113.03030
## [73] 113.63636 114.24242 114.84848 115.45455 116.06061 116.66667
## [79] 117.27273 117.87879 118.48485 119.09091 119.69697 120.30303
## [85] 120.90909 121.51515 122.12121 122.72727 123.33333 123.93939
## [91] 124.54545 125.15152 125.75758 126.36364 126.96970 127.57576
## [97] 128.18182 128.78788 129.39394 130.00000
```

## B

Draw k random numbers from a  $N(\mu, \sigma^2)$  distribution.

```
x <- rnorm(k, mu, sigma)
x
```

```
## [1] 111.81550 105.11057 107.57195 116.66237 102.58735 133.23214
## [7] 113.78325 101.99208 113.00321 88.48737 96.89716 83.14361
## [13] 105.99020 94.87457 105.34087 84.69317 102.04234 87.11990
## [19] 115.91591 102.51473 129.03756 87.48175 100.11159 86.94703
## [25] 108.14616 63.61421 102.43301 94.90819 92.86999 120.76896
## [31] 92.87162 111.29991 107.80203 73.68671 98.83659 98.07657
## [37] 133.99439 100.26772 90.25052 106.49521 63.63684 104.10300
## [43] 98.14482 126.16222 108.36391 118.55188 108.24957 85.67214
## [49] 98.78656 100.23126 96.10764 102.05325 96.18181 113.20582
## [55] 98.04756 81.89079 110.33528 93.89442 114.21377 101.05782
## [61] 102.11027 88.49120 94.95910 98.97983 99.03527 100.76111
## [67] 84.12240 102.25319 95.03578 77.96350 91.01983 101.12252
## [73] 94.74650 82.67010 87.60187 105.13937 86.01065 98.89825
## [79] 100.01554 116.41624 84.61268 94.22181 104.88815 109.83950
## [85] 81.53582 85.12409 93.00023 121.53631 99.71061 110.19871
## [91] 124.81540 111.12916 107.78170 105.25640 112.31668 112.40396
## [97] 103.54960 81.88215 117.74711 81.74624 114.47579 107.21024
## [103] 124.20838 113.31998 106.91130 119.70029 85.58543 88.15368
## [109] 89.87351 102.45159 102.77164 96.46540 126.60625 86.76625
## [115] 111.85179 90.65092 79.10865 116.67700 124.33148 86.16069
## [121] 132.49228 109.39336 88.70049 88.86166 102.91331 104.43052
## [127] 89.21425 79.10345 121.81557 74.13212 107.78324 87.89529
## [133] 119.93364 140.34491 77.35448 89.67528 88.54371 98.84700
## [139] 108.03902 114.77991 95.72806 90.75430 84.94412 99.36378
## [145] 82.14903 91.63338 120.37371 92.26157 99.50137 96.13571
## [151] 117.21311 107.31959 93.65310 85.06834 128.28505 102.23863
## [157] 117.00998 106.19748 111.36028 105.00287 80.21518 119.28251
## [163] 92.46728 95.69515 102.15649 89.64313 84.06324 109.04458
## [169] 102.81601 107.31892 84.88019 90.09382 92.55748 78.06616
## [175] 93.76319 105.98800 77.15547 116.23888 97.39932 124.43496
```

##	[181]	80.31517	119.69583	108.26356	95.87222	96.60672	119.69355
##	[187]	111.02096	101.99741	104.31845	78.21812	118.81323	138.51112
##	[193]	100.65525	95.23857	93.10682	102.35031	117.71641	105.62342
##	[199]	102.65915	115.36834	105.11112	112.06377	118.05968	126.73199
##	[205]	97.21961	117.41499	105.41953	89.08057	116.60864	114.17407
##	[211]	100.65425	114.60243	118.81814	104.92172	105.86788	95.40245
##	[217]	93.56999	102.01724	107.31211	124.65789	108.17638	102.07160
##	[223]	108.85875	106.33196	89.21991	93.67092	94.25565	132.27932
##	[229]	112.37081	113.64172	113.94430	107.23518	81.03265	111.14285
##	[235]	109.36679	71.31156	102.68408	94.96773	120.94486	100.13128
##	[241]	98.74098	104.39049	102.04497	89.86245	101.99163	97.48645
##	[247]	110.24411	90.07260	88.58455	97.98207	112.00390	88.20015
##	[253]	88.59622	116.17434	80.38401	83.72337	72.78965	118.05969
##	[259]	108.53462	112.38678	99.65834	94.25578	92.80496	110.55688
##	[265]	84.33835	108.47441	129.36921	111.13043	77.39185	98.68243
##	[271]	93.99505	114.40714	91.38898	129.81715	91.86946	90.19830
##	[277]	100.90961	90.78033	94.21649	90.96028	125.89487	96.17291
##	[283]	105.56670	121.95468	119.59926	76.87945	87.98486	92.94070
##	[289]	95.08724	106.06562	92.60308	108.47683	87.65093	128.65845
##	[295]	72.27959	85.52690	93.32592	98.98131	102.50896	81.83098
##	[301]	97.29409	110.36629	103.44122	93.80558	105.28751	90.39172
##	[307]	92.99673	90.35568	102.67163	84.26035	100.25535	111.22997
##	[313]	103.54889	100.19497	90.27161	91.14454	113.46908	95.49292
##	[319]	102.28906	125.99981	107.13773	109.29189	119.52448	88.15907
##	[325]	99.35194	93.78481	96.08172	94.62545	77.92676	76.78564
##	[331]	109.18980	105.11870	84.01516	119.38931	119.27017	105.34752
##	[337]	95.26611	95.35942	88.33372	110.18443	92.76699	149.60503
##	[343]	91.88583	101.27190	79.60626	121.99862	78.71551	80.31658
##	[349]	91.07765	85.32908	121.83674	88.33966	114.62372	109.90178
##	[355]	79.24682	95.21011	116.48660	115.43618	75.46866	98.99348
##	[361]	109.68377	104.51545	111.03796	96.54552	115.91693	101.95967
##	[367]	96.54881	114.89165	91.24350	110.73008	98.05953	86.57072
##	[373]	83.77114	115.17874	137.77973	96.29841	118.36564	105.27041
##	[379]	92.14577	73.32035	90.64618	110.37720	100.12723	96.29161
##	[385]	74.16003	117.69056	90.25769	127.66394	82.77696	81.13682
##	[391]	125.29411	115.53274	111.13856	127.20825	120.51381	107.63746
##	[397]	109.84479	98.86139	77.18097	121.18638	96.84384	69.18383
##	[403]	94.19028	58.36652	104.25435	91.93661	93.93207	73.85756
##	[409]	112.78068	86.53384	90.82888	106.52706	100.05422	75.82236
##	[415]	98.67076	106.54553	100.42797	102.38354	94.05818	116.83352
##	[421]	102.51662	108.06319	83.64898	98.23989	108.19912	82.55568
##	[427]	100.32634	55.43045	92.46833	94.71134	103.98187	85.68653
##	[433]	82.39085	107.98862	109.12123	106.21836	88.87573	100.88497
##	[439]	97.13169	108.32854	99.57315	107.74713	105.87442	99.99985
##	[445]	100.18738	94.91421	114.02370	82.37005	125.29380	94.85441
##	[451]	86.48527	97.62817	122.40870	82.93527	140.16826	101.96481
##	[457]	108.92706	102.58011	105.27039	110.36087	105.39471	93.27389
##	[463]	107.80319	94.97891	131.88331	97.86914	100.95254	89.95408
##	[469]	115.32599	98.23057	115.92549	100.78670	96.52892	97.14000
##	[475]	90.65317	107.54263	112.98749	98.87653	101.12940	92.60462
##	[481]	107.96828	106.92988	118.84536	131.42338	108.47494	90.92506
##	[487]	95.52486	119.23468	119.23450	103.25315	95.59749	110.72340
##	[493]	102.96771	101.39432	95.01810	68.51408	128.02478	101.79506
##	[499]	109.96757	72.57522	88.57057	117.42932	123.62154	101.68222



##	[505]	78.66772	88.58170	113.61590	114.59701	125.15576	82.68101
##	[511]	108.39543	78.45247	78.52698	94.18538	89.67829	80.95030
##	[517]	115.49945	77.96789	121.89010	77.16785	87.84926	119.09879
##	[523]	103.53593	118.92569	91.28409	117.47258	100.50372	109.97954
##	[529]	69.85022	100.50475	115.51751	96.97368	104.64068	113.91043
##	[535]	97.86775	110.91499	117.32346	82.38517	115.47646	74.56794
##	[541]	97.74633	135.74629	84.08167	130.30951	102.91113	114.35284
##	[547]	110.24170	94.95265	110.66756	88.02814	96.46506	97.56977
##	[553]	109.88732	128.76982	104.36800	105.69808	115.62810	95.69939
##	[559]	110.23476	110.28985	86.83547	104.20135	105.27041	93.37589
##	[565]	119.21994	87.04122	98.58537	108.08929	93.61315	78.73572
##	[571]	94.74394	105.06949	115.04109	79.99934	116.69272	110.86943
##	[577]	127.02569	118.77266	84.41615	113.92691	94.61000	90.62521
##	[583]	78.68713	91.66728	94.08430	89.66717	108.90340	113.93088
##	[589]	110.29978	84.12216	113.51639	93.05213	90.41704	105.61703
##	[595]	140.57071	92.11610	114.32372	134.00053	80.18048	102.73681
##	[601]	68.49247	90.33024	107.64916	76.99919	72.70580	130.81178
##	[607]	122.93054	97.68679	106.68487	111.27839	100.97801	78.89188
##	[613]	87.19029	106.60242	93.65198	118.87144	97.35085	107.38679
##	[619]	97.34918	98.25184	102.36338	113.42518	88.70861	83.53566
##	[625]	87.95561	123.60893	95.79197	115.88486	101.00112	95.98057
##	[631]	65.49626	107.94358	88.44911	126.25209	127.45185	107.26052
##	[637]	83.69395	85.81298	88.50635	110.96130	80.49573	102.04868
##	[643]	116.35979	104.34363	96.00500	107.22494	109.55507	109.48240
##	[649]	89.46945	101.28463	103.70692	123.63542	123.10812	100.75017
##	[655]	107.85701	126.54419	87.04951	99.07456	95.70742	80.19565
##	[661]	100.76176	89.76249	91.14433	94.99735	123.62707	116.27242
##	[667]	119.16036	119.08994	125.93907	120.10419	78.36453	89.35127
##	[673]	80.21061	116.80043	88.33289	108.03454	120.17314	85.67511
##	[679]	87.37666	104.10339	105.96337	95.63933	87.13064	80.75869
##	[685]	96.47415	135.84672	74.21614	129.27509	128.85253	124.64197
##	[691]	129.02152	110.30747	116.09581	116.20475	95.96962	103.91280
##	[697]	68.19310	113.01695	113.59148	102.95228	105.05778	82.30172
##	[703]	95.78051	98.21847	68.44268	100.14289	91.24166	92.01329
##	[709]	98.68056	112.85426	100.40237	118.46810	97.90842	75.36033
##	[715]	125.30334	87.27636	109.92717	97.14507	98.17626	90.56083
##	[721]	125.21571	113.38730	77.26651	104.61750	70.82140	105.79856
##	[727]	82.94435	100.43713	114.55546	51.63407	99.75576	94.98605
##	[733]	95.31108	109.58497	86.26895	127.79368	91.27377	86.09738
##	[739]	75.00617	113.34921	112.85756	121.87806	85.01325	84.61091
##	[745]	83.79976	101.85726	64.29076	121.48048	105.15191	116.28685
##	[751]	78.82731	102.47899	115.47609	106.92714	107.26109	85.83131
##	[757]	82.84319	103.35503	129.02192	108.61487	104.46340	126.96037
##	[763]	91.74861	90.34609	120.41902	95.46912	85.43982	101.08196
##	[769]	68.88019	84.00218	96.53157	106.79507	104.71065	113.00415
##	[775]	97.48958	121.32541	102.73447	105.87576	107.78017	94.86252
##	[781]	79.85674	118.80998	116.31091	117.15027	93.71613	101.87251
##	[787]	115.78532	113.29923	110.43730	92.05049	110.35926	75.83121
##	[793]	92.29347	112.03417	96.21854	103.15249	111.38173	120.12661
##	[799]	99.51594	109.72423	115.21211	70.39942	125.88062	94.71636
##	[805]	97.30575	108.82266	126.16589	100.83997	90.88216	120.34932
##	[811]	116.13204	86.15911	125.01314	113.28183	97.36589	84.69404
##	[817]	103.69026	85.56980	101.13507	111.98192	120.06893	121.55189
##	[823]	128.53544	96.74572	92.08524	95.45367	105.26260	95.36313

##	[829]	141.78442	117.31509	88.95213	102.21168	99.57861	90.02841
##	[835]	104.51971	153.08085	128.82671	116.56664	86.34511	101.02615
##	[841]	111.04960	85.49321	105.12895	103.18322	101.32367	99.65001
##	[847]	116.78910	118.66782	109.52468	99.54961	113.92137	109.40565
##	[853]	102.58145	108.27186	88.03936	80.97535	124.55594	97.61271
##	[859]	121.65675	74.15773	69.30525	122.06039	103.22659	116.92425
##	[865]	102.43751	52.31495	118.77970	95.12763	92.53659	91.48223
##	[871]	100.65659	88.54331	90.76039	104.36605	92.94000	84.24001
##	[877]	78.60098	93.04079	114.90545	139.31347	107.14316	101.77473
##	[883]	105.75989	77.78787	101.91154	109.23163	78.17634	95.75615
##	[889]	95.54472	90.93426	81.00409	87.02392	86.24658	90.69138
##	[895]	106.02382	93.32587	98.02530	105.39316	102.76286	65.24549
##	[901]	96.99959	99.64356	104.55127	116.22793	84.75546	134.48581
##	[907]	81.33359	101.77555	94.87825	124.13572	79.44482	112.32354
##	[913]	79.21632	112.37602	99.23214	109.97753	110.41431	93.46807
##	[919]	102.47045	112.19530	80.82598	128.35296	101.56177	102.62447
##	[925]	95.88572	130.57834	94.19320	99.67522	81.68940	99.55558
##	[931]	111.60896	81.29589	105.30867	84.84480	99.07460	106.31134
##	[937]	114.75153	92.70311	104.68453	90.94946	85.40235	80.60550
##	[943]	121.21032	68.65934	105.50314	98.87259	91.77600	86.84297
##	[949]	92.70504	111.63126	97.39825	139.38351	136.87053	93.35068
##	[955]	110.79857	55.02418	103.34744	101.02688	104.26524	88.84265
##	[961]	95.82809	105.41828	91.42732	99.93580	107.17238	101.61029
##	[967]	128.30021	102.28673	84.53021	106.90920	105.82203	93.21783
##	[973]	72.87842	119.64916	97.56078	83.70787	81.01017	83.29703
##	[979]	113.83566	95.59472	94.10893	89.29045	94.76589	79.69577
##	[985]	122.58729	93.41253	117.51742	104.73585	108.48835	135.50108
##	[991]	98.24204	96.58186	92.70303	86.18155	83.34300	108.96744
##	[997]	92.81417	90.73922	88.01567	91.82054	114.81708	103.66650
##	[1003]	88.53555	128.67686	110.84710	79.40112	76.92943	104.66475
##	[1009]	102.37153	116.70437	130.60286	81.87520	99.84696	119.97631
##	[1015]	110.56401	99.63884	121.88229	61.09587	83.52849	93.51820
##	[1021]	96.97908	118.30580	125.41346	118.12162	91.26894	104.06484
##	[1027]	116.99713	90.44352	81.74859	101.97900	109.10748	107.12671
##	[1033]	79.74398	97.04450	113.94662	106.24730	115.77279	97.05331
##	[1039]	90.73936	96.40521	130.95772	99.01485	91.46902	99.84481
##	[1045]	117.27015	108.65352	83.00159	90.51526	88.28562	73.30527
##	[1051]	85.22122	112.25358	80.76840	75.30637	83.43614	98.96406
##	[1057]	103.52866	81.65552	104.73860	81.30368	97.24646	106.03632
##	[1063]	130.22403	59.74536	70.71720	93.84834	89.27184	90.56318
##	[1069]	98.32098	97.81142	120.80153	107.01890	132.43305	95.31044
##	[1075]	81.01757	94.10694	74.83432	96.73281	104.77763	104.48263
##	[1081]	70.00392	106.03101	105.89719	110.70863	86.68269	81.27627
##	[1087]	112.06364	83.80730	68.62509	88.13435	92.77863	94.41327
##	[1093]	105.24711	110.61691	106.09843	105.51232	89.37470	94.83916
##	[1099]	106.55933	120.92865	109.40615	87.36604	92.96097	118.56292
##	[1105]	100.01541	100.29415	108.35254	121.39199	92.88635	98.20986
##	[1111]	100.44594	84.65659	86.91967	84.02997	97.27149	104.53062
##	[1117]	118.16201	108.67726	118.57359	114.99468	77.27520	111.14394
##	[1123]	122.24124	109.72530	104.80680	118.73314	86.50599	133.50365
##	[1129]	99.92913	96.54094	111.40058	104.00494	90.73068	97.90858
##	[1135]	100.12498	81.86922	105.89015	96.67914	100.44553	115.46637
##	[1141]	100.70289	104.91843	111.14278	97.68358	109.50574	90.93716
##	[1147]	95.31272	93.28498	82.16653	122.81949	86.11338	117.86442

##	[1153]	84.00553	93.87775	85.64785	102.62805	113.14295	118.12368
##	[1159]	116.92581	108.93595	72.70327	114.70297	98.23606	101.50668
##	[1165]	107.39777	74.82804	99.19346	120.54424	96.70053	123.45555
##	[1171]	93.46426	92.79427	78.82469	121.04247	96.25822	104.86529
##	[1177]	128.48427	117.84908	75.50225	89.67412	111.10625	88.69798
##	[1183]	98.88573	96.75966	104.38403	114.40435	112.36997	94.06527
##	[1189]	76.73343	111.68968	78.63072	78.67876	88.54950	107.45567
##	[1195]	117.20948	98.24833	100.43436	113.56598	76.32895	108.49410
##	[1201]	107.38764	89.18134	104.10246	114.16353	129.21729	89.21930
##	[1207]	97.00239	97.32876	86.47937	102.76353	95.55302	110.64198
##	[1213]	102.25284	106.94046	106.61169	116.57322	105.51759	93.68206
##	[1219]	88.30176	103.90574	79.33727	98.16601	113.26762	95.00656
##	[1225]	86.37085	85.67109	91.25596	75.40167	101.91824	118.81225
##	[1231]	97.84005	69.73680	86.34904	95.01353	107.80788	71.63299
##	[1237]	85.59440	103.93049	104.73437	82.67848	110.74794	107.76644
##	[1243]	96.40669	109.90928	74.26571	82.34221	107.38220	66.23411
##	[1249]	92.95327	94.39721	122.34819	113.96152	95.90391	94.57843
##	[1255]	111.01718	96.59198	119.94124	93.08387	104.70196	110.32261
##	[1261]	103.68153	94.50623	99.48280	95.93343	100.16576	103.55560
##	[1267]	88.45074	99.69911	113.06267	77.06040	87.86528	107.36275
##	[1273]	74.07229	88.28384	93.08567	108.33843	88.47559	89.90969
##	[1279]	106.22970	89.42083	101.10592	112.55845	66.33567	114.75910
##	[1285]	106.19812	98.78769	104.48843	109.91611	91.26373	91.18492
##	[1291]	89.11607	106.05447	92.40466	112.81432	95.92021	90.08890
##	[1297]	85.94020	99.83910	91.17588	110.69238	124.94126	112.43200
##	[1303]	72.28365	92.39841	68.90293	111.51092	128.88534	118.27242
##	[1309]	87.41560	84.93691	101.97356	91.40658	84.73051	105.91069
##	[1315]	103.91451	111.81869	118.53443	95.52688	100.18487	110.10784
##	[1321]	113.31381	116.81029	119.91874	87.17791	105.80692	97.57928
##	[1327]	94.72537	95.24773	107.73588	86.54269	87.20085	102.07928
##	[1333]	106.95325	82.40284	112.71832	70.32350	93.33645	119.25354
##	[1339]	113.00405	106.00795	81.13705	93.65552	85.10068	123.90711
##	[1345]	96.84531	103.93240	116.24411	84.85063	117.74516	81.82584
##	[1351]	108.62806	121.77529	108.74179	73.96815	66.94434	98.53627
##	[1357]	94.09904	98.45196	110.83925	75.35068	108.23483	107.15450
##	[1363]	83.42652	123.49393	109.03873	86.98926	87.43928	92.72360
##	[1369]	74.46795	98.35297	97.67713	89.31400	91.93541	112.17814
##	[1375]	71.98450	96.69410	99.41983	98.86029	82.07668	94.54857
##	[1381]	112.46620	118.50735	90.71970	101.43284	92.62185	97.81275
##	[1387]	89.90176	98.57266	103.69578	109.94102	92.41387	95.14075
##	[1393]	73.85405	117.03425	111.62686	84.96124	107.33995	91.64790
##	[1399]	90.14803	105.33430	100.83209	115.68005	102.75481	87.26939
##	[1405]	74.25268	81.22359	96.36881	88.29390	97.81658	68.37612
##	[1411]	106.54967	117.79640	106.97675	107.03623	107.05863	105.18807
##	[1417]	100.98193	95.82500	91.35640	93.45223	95.26423	104.07393
##	[1423]	78.54104	126.33531	79.83660	90.75172	110.14068	104.10026
##	[1429]	92.84358	99.61968	106.00710	82.17782	133.20225	98.89286
##	[1435]	91.36945	126.71589	99.89619	108.16238	120.08516	88.04224
##	[1441]	98.11818	96.37327	80.13046	84.03823	96.12422	91.71207
##	[1447]	94.78943	85.76002	114.54120	84.72107	100.54962	95.05750
##	[1453]	102.85618	83.92680	122.16522	113.89904	86.73168	113.82260
##	[1459]	84.82465	63.46636	105.98614	99.90203	107.73392	118.03408
##	[1465]	92.46782	97.42533	109.60401	84.53543	92.26729	105.11084
##	[1471]	103.04780	71.98517	103.63828	118.57350	80.60014	111.67467

##	[1477]	114.25038	118.18572	94.26564	124.51637	101.80674	82.57606
##	[1483]	78.70518	91.14030	126.21212	110.16382	63.35405	103.80216
##	[1489]	106.65925	107.66279	91.33238	117.32941	83.39227	99.49988
##	[1495]	86.17480	101.76415	112.81840	113.79398	89.27468	106.20363
##	[1501]	97.83309	133.71663	78.98526	106.48170	87.49210	111.07324
##	[1507]	113.54491	96.29353	112.71919	109.94957	104.55641	101.81314
##	[1513]	112.47417	98.51775	137.23758	97.05842	120.25599	79.93164
##	[1519]	128.61824	114.14643	100.61910	85.35558	89.20581	84.15691
##	[1525]	85.08686	118.79062	108.05720	99.74455	102.88343	96.43422
##	[1531]	104.09759	100.59501	73.38407	79.33751	88.03924	87.05154
##	[1537]	123.90532	99.88394	84.41840	58.79825	96.84290	85.28993
##	[1543]	94.99975	102.13209	112.39736	107.58724	120.29868	101.02094
##	[1549]	89.54589	88.70561	124.84009	75.45660	95.07389	100.33913
##	[1555]	92.75660	106.11944	107.45440	96.93064	128.86362	69.25494
##	[1561]	100.13341	101.79961	87.07544	90.94546	105.43885	86.34143
##	[1567]	87.86433	98.17057	106.40029	76.52447	111.90533	101.25617
##	[1573]	113.18825	74.47083	96.79536	90.39135	106.94596	114.07053
##	[1579]	97.61247	88.44822	98.95040	104.38836	110.88870	100.74916
##	[1585]	89.09793	112.02672	122.84676	102.04235	82.47158	94.88238
##	[1591]	87.43193	123.56437	91.37394	88.31941	94.91494	82.56134
##	[1597]	93.62156	112.58443	91.66225	109.42156	83.21391	100.11574
##	[1603]	71.65535	83.82365	100.01274	114.17986	101.71536	122.24826
##	[1609]	86.74187	107.32749	122.15635	95.16364	81.31883	117.16666
##	[1615]	114.90540	122.67928	100.97544	99.30559	114.81264	119.27928
##	[1621]	80.30455	99.01122	91.03553	99.31604	98.73345	96.90421
##	[1627]	80.10208	109.49927	114.63350	96.27717	101.79157	78.09850
##	[1633]	79.19624	113.57337	97.81787	96.07598	104.29451	95.68205
##	[1639]	106.97352	101.35058	121.65151	99.34500	125.93814	96.51805
##	[1645]	107.67932	105.83586	106.58262	96.84889	88.04891	89.91213
##	[1651]	98.30672	100.66273	127.15121	92.19317	116.87008	89.03419
##	[1657]	121.26128	119.24405	119.06414	98.54296	98.84875	74.45075
##	[1663]	84.62566	113.19564	76.92280	89.30882	98.09074	105.13737
##	[1669]	89.65428	93.16475	115.35203	103.78655	88.86340	88.04670
##	[1675]	94.24331	123.19056	95.76870	102.25778	98.61316	105.14500
##	[1681]	114.33623	100.59816	111.60037	121.28961	93.64823	96.15175
##	[1687]	86.65437	111.19604	115.66531	100.91777	108.32373	79.65833
##	[1693]	107.24794	104.18339	81.10414	127.95058	101.64240	105.67421
##	[1699]	99.75592	108.48495	99.04754	84.17565	85.33730	100.93360
##	[1705]	111.15321	109.14468	86.15755	94.38090	85.21670	106.18685
##	[1711]	90.28806	136.30157	89.45198	95.04977	95.95581	103.03809
##	[1717]	95.46300	108.37975	79.91531	104.78253	104.82710	105.56596
##	[1723]	79.31161	73.31241	132.68104	113.84146	79.06398	89.24117
##	[1729]	99.15229	118.67706	65.08302	110.35172	102.00435	88.31679
##	[1735]	119.86996	72.33402	89.81885	70.58239	108.17876	101.27418
##	[1741]	100.76477	94.16488	132.64406	96.07178	82.19675	110.85372
##	[1747]	92.11293	95.34429	99.73309	88.64612	96.83016	108.08513
##	[1753]	109.33571	77.87387	102.72508	113.34365	110.44358	97.38328
##	[1759]	108.01017	72.77072	81.59630	87.96106	118.06773	92.82298
##	[1765]	86.84965	81.46623	114.89648	88.25734	97.05338	122.63154
##	[1771]	117.85236	107.28319	122.68478	88.20316	113.37211	105.91164
##	[1777]	99.43305	119.79636	111.31601	105.22353	81.91094	110.99491
##	[1783]	62.20508	127.97666	72.90130	79.42526	109.09248	118.83323
##	[1789]	126.69063	102.38828	83.32970	94.76665	114.20391	134.28267
##	[1795]	119.59626	85.18931	79.33370	93.56848	119.34547	125.34928

##	[1801]	96.13557	121.50241	110.61972	100.47246	115.53216	120.78672
##	[1807]	80.57810	116.49031	120.70996	106.42259	98.65284	113.89129
##	[1813]	133.62100	109.92160	78.01183	98.55525	81.29496	100.87894
##	[1819]	106.44201	118.49283	92.17309	87.85033	83.82627	97.48760
##	[1825]	81.72491	98.30564	77.37812	91.85511	98.35917	98.90022
##	[1831]	68.91733	101.03614	104.42962	120.51694	87.55216	98.66948
##	[1837]	97.53697	105.31560	96.02475	98.79467	123.69391	110.98966
##	[1843]	130.42377	105.28789	106.55454	94.71845	111.68088	101.23462
##	[1849]	97.44504	89.91278	112.39740	94.76501	111.08144	109.21361
##	[1855]	86.41137	90.45991	126.87681	98.34857	118.92561	114.10546
##	[1861]	111.75817	118.67366	71.63019	105.90281	110.30096	88.11722
##	[1867]	90.50125	99.20440	79.82230	110.45973	115.27373	69.13910
##	[1873]	95.83546	87.17676	86.30421	102.49240	104.67975	91.94306
##	[1879]	103.84572	106.90397	105.47503	87.89390	106.54557	111.35298
##	[1885]	82.90959	126.67074	108.22164	96.71004	124.94713	86.89451
##	[1891]	110.34879	113.55974	105.26010	87.69518	95.62195	99.93308
##	[1897]	103.29027	67.32584	111.88881	82.24167	97.21205	115.34143
##	[1903]	96.39130	130.80576	64.82910	86.28732	101.56930	81.74013
##	[1909]	112.13959	92.18248	80.19365	91.82248	93.92557	102.12639
##	[1915]	97.17377	103.58934	114.17285	105.60869	97.50714	94.04850
##	[1921]	90.51250	101.41435	117.49769	100.70528	102.21967	104.58441
##	[1927]	114.05649	107.31474	122.80757	94.06445	110.23572	105.79988
##	[1933]	80.75267	113.52690	106.55224	131.74379	117.57196	97.38759
##	[1939]	95.78911	104.31114	98.22104	73.00141	90.31050	85.15479
##	[1945]	77.01886	83.40854	106.02736	89.28020	103.04226	102.50682
##	[1951]	79.27258	117.53509	104.34267	125.47996	95.02058	128.63919
##	[1957]	63.71528	101.77676	89.34557	84.57774	93.77281	108.18773
##	[1963]	98.50830	122.68454	79.89452	116.64512	80.46913	131.58570
##	[1969]	124.69748	102.98319	122.57247	94.17356	112.03840	89.36244
##	[1975]	113.10344	103.27631	123.09850	104.76003	85.11369	81.59096
##	[1981]	89.24344	107.82505	112.03515	114.78215	99.92170	105.59362
##	[1987]	89.07351	85.23673	88.94762	104.12993	114.86173	94.16867
##	[1993]	99.30972	116.61832	70.91889	130.78114	94.61933	118.15457
##	[1999]	129.69619	111.91743	95.13366	88.91358	102.25630	108.46814
##	[2005]	137.92295	116.87071	81.40081	131.02477	77.71335	106.28932
##	[2011]	108.83875	96.45919	86.44778	84.13902	103.05006	88.25629
##	[2017]	80.09365	104.48080	86.14173	83.45856	71.05173	97.81998
##	[2023]	102.75288	82.99699	83.93976	108.85880	113.73186	103.61838
##	[2029]	105.42624	121.34537	95.01785	108.05251	111.84748	101.59532
##	[2035]	120.72929	106.98242	85.93030	81.30388	94.04651	108.25403
##	[2041]	81.39192	106.69532	92.40931	94.82318	74.96202	109.32691
##	[2047]	108.33138	106.98550	99.10103	88.55816	89.28721	122.74331
##	[2053]	89.48709	126.82026	77.60105	109.74688	83.97564	104.10303
##	[2059]	108.73496	109.51277	90.69141	69.33507	99.30198	95.37709
##	[2065]	111.23950	102.48461	92.72107	124.55460	99.00291	104.62950
##	[2071]	107.48940	105.46527	121.88448	111.67345	83.63538	96.71955
##	[2077]	109.57948	115.84694	82.40824	91.32616	95.35040	97.00653
##	[2083]	91.50145	85.92667	98.24274	123.33116	83.38673	91.83891
##	[2089]	84.79139	99.09433	99.45059	88.27634	124.66004	121.36304
##	[2095]	101.68676	125.33102	118.10104	107.12722	136.61586	108.67204
##	[2101]	119.00564	73.29293	132.91344	113.32045	80.50365	81.63109
##	[2107]	96.34666	102.42318	102.21900	110.82290	116.75993	104.10204
##	[2113]	81.62648	92.71378	96.10489	93.45784	98.28015	111.24043
##	[2119]	104.71263	100.91007	85.48397	113.72153	87.57233	115.88692

##	[2125]	85.72213	102.35998	99.16527	85.01996	122.74681	110.78241
##	[2131]	100.86870	94.89047	115.12553	96.61235	101.46395	77.06409
##	[2137]	111.64656	83.46972	107.49150	119.98132	120.97187	101.34245
##	[2143]	95.05712	97.23079	104.18039	109.29105	86.13906	124.63952
##	[2149]	73.50543	113.30497	82.20788	103.32861	113.43443	96.83978
##	[2155]	121.63409	92.67706	129.92019	91.42722	95.20575	82.37376
##	[2161]	79.30665	75.72148	120.25252	130.44195	106.36577	78.92983
##	[2167]	85.08727	126.62273	94.58020	129.15015	108.75472	104.08475
##	[2173]	99.25456	114.15041	91.31703	84.34902	80.58469	92.73759
##	[2179]	129.90436	113.21944	106.02849	120.83717	98.20779	113.93611
##	[2185]	115.20047	83.26732	116.99316	98.26599	91.52168	94.47940
##	[2191]	111.71309	123.94207	104.34385	99.90472	97.52498	85.27547
##	[2197]	105.20960	87.57748	94.48507	82.46401	102.26139	109.11939
##	[2203]	88.82429	116.00901	82.56272	110.14526	86.12744	121.47749
##	[2209]	109.12864	110.67146	99.54978	83.65221	78.24638	114.83643
##	[2215]	109.42383	116.36578	77.35953	116.86630	95.90662	115.28751
##	[2221]	94.49140	95.07285	101.27188	65.57767	102.39943	108.71609
##	[2227]	92.25926	94.47368	102.47359	110.71553	114.00280	95.11710
##	[2233]	87.37028	88.21523	106.74677	102.78312	94.23435	120.75703
##	[2239]	96.74790	105.51647	119.58391	69.14481	126.40118	90.50901
##	[2245]	106.79054	93.23273	62.21872	94.68720	120.43336	112.11281
##	[2251]	82.31779	97.13036	92.05047	102.14760	109.84654	104.19667
##	[2257]	79.94053	88.27056	98.08434	97.97087	100.28530	109.21094
##	[2263]	108.12259	114.10882	90.28853	134.89969	115.48941	104.30541
##	[2269]	119.63055	123.47602	88.68001	113.07786	125.97704	90.35000
##	[2275]	88.92486	116.89830	104.63349	103.33528	70.22861	94.87530
##	[2281]	76.25270	78.08629	75.53896	90.05537	116.16196	99.66172
##	[2287]	69.32920	89.53516	94.98138	70.91852	80.49586	116.97701
##	[2293]	109.71497	112.28249	118.90811	100.25305	102.44028	73.15251
##	[2299]	91.40746	94.97196	110.50378	109.62818	107.86765	79.95329
##	[2305]	87.59211	122.52995	97.89780	116.84115	124.79792	96.32136
##	[2311]	104.86690	128.83178	111.01418	104.39974	65.92602	120.04248
##	[2317]	78.43020	92.85292	97.97570	99.36717	102.68816	97.36113
##	[2323]	107.71439	101.84649	103.27763	81.93279	105.27156	96.01652
##	[2329]	106.37442	101.88892	128.46703	81.33663	95.62833	100.63975
##	[2335]	100.14154	106.91278	82.07998	110.69619	100.55802	131.15716
##	[2341]	106.38307	106.01754	112.14679	123.77093	101.97800	123.59167
##	[2347]	114.25724	116.97063	89.96138	87.55268	117.60145	60.93489
##	[2353]	102.87417	99.38745	101.52441	94.32433	110.46470	97.27076
##	[2359]	81.58815	93.00982	107.25527	107.39276	115.88663	100.47545
##	[2365]	101.29148	105.93441	92.44750	99.43272	101.11670	87.42294
##	[2371]	102.26164	69.60148	93.42872	99.56633	103.77547	80.81693
##	[2377]	103.77948	86.47452	90.65218	114.62617	96.40742	85.99323
##	[2383]	93.32976	110.78047	108.54251	119.27639	106.14622	94.46022
##	[2389]	87.74725	89.38198	111.13016	90.04078	123.31709	103.54899
##	[2395]	126.83354	106.15317	104.49963	130.24734	94.68464	103.50631
##	[2401]	84.34417	120.37606	103.06994	74.73363	83.58279	114.50272
##	[2407]	113.98775	88.84974	115.40304	106.18773	100.15076	121.99766
##	[2413]	122.28073	131.01268	59.90250	119.48539	110.86464	118.12255
##	[2419]	100.40646	88.35943	101.02997	88.72544	102.81332	109.21528
##	[2425]	105.17951	128.83279	103.34955	101.65415	95.15198	94.89318
##	[2431]	132.72451	82.77386	113.93477	127.98162	89.23099	126.88301
##	[2437]	95.58845	111.67569	104.83419	90.76237	76.64841	98.03346
##	[2443]	89.15559	94.67102	92.55322	91.45418	89.43518	141.06290

##	[2449]	97.90898	99.80620	124.86210	128.96809	110.31230	85.10763
##	[2455]	98.73407	98.87544	86.43884	64.89854	81.87888	96.95883
##	[2461]	107.87035	133.21336	128.44266	110.79140	107.16536	77.90727
##	[2467]	98.96456	99.72221	97.62225	90.12900	90.69548	75.58456
##	[2473]	121.18046	85.67307	86.02436	84.54148	83.35406	88.74558
##	[2479]	78.32671	112.32449	95.50923	89.43388	126.72667	88.14038
##	[2485]	91.39608	82.34932	92.11633	90.93777	102.93303	90.44211
##	[2491]	73.10528	77.25579	98.05347	85.59305	105.28203	70.61743
##	[2497]	100.49941	99.81001	120.76285	87.89618	78.63411	85.80466
##	[2503]	90.37343	101.40742	93.55643	94.13501	111.32093	114.55809
##	[2509]	103.15840	109.45750	98.25796	128.26294	100.36046	79.80750
##	[2515]	91.97995	94.85282	90.50531	95.60835	116.15614	106.11722
##	[2521]	65.75231	103.30481	112.80989	105.45793	83.63625	70.75594
##	[2527]	113.72836	102.54468	126.06863	111.77700	97.36469	95.28987
##	[2533]	99.64837	105.57264	89.42727	91.41067	130.69969	103.15236
##	[2539]	79.95521	95.02075	97.54123	119.31441	119.54242	131.76012
##	[2545]	96.20902	91.93878	37.37630	128.74703	104.90841	116.90064
##	[2551]	95.62766	119.37749	88.47611	121.91686	101.22526	83.86793
##	[2557]	115.50892	78.71429	125.80512	97.36515	89.36721	96.35353
##	[2563]	104.08319	84.49759	89.51508	84.86802	80.94032	108.37435
##	[2569]	101.47421	112.08112	98.93901	85.22729	112.03844	67.09222
##	[2575]	134.75599	85.93229	116.67282	80.88702	88.57656	109.21532
##	[2581]	119.27436	106.27401	72.91989	115.13705	113.24857	107.37235
##	[2587]	86.80281	120.63535	92.70555	85.18051	101.77620	69.51968
##	[2593]	114.41240	90.89733	108.61299	109.73549	81.00915	103.61103
##	[2599]	93.34371	95.25608	91.30612	87.90181	93.98010	107.99858
##	[2605]	105.44205	106.29620	98.00794	93.98834	88.53085	94.78152
##	[2611]	109.46501	101.76862	86.77704	125.16636	82.99627	108.04883
##	[2617]	85.53526	102.02971	133.09264	97.52786	76.98467	124.99915
##	[2623]	100.63225	107.36453	120.53234	106.10244	109.00207	120.43135
##	[2629]	86.05746	96.60288	110.35879	126.88449	107.85168	107.38220
##	[2635]	96.40541	109.74434	87.37619	98.96751	100.33694	97.25192
##	[2641]	88.55365	126.89382	124.38801	116.10156	102.33480	88.67092
##	[2647]	123.22037	92.38479	89.48289	118.89084	89.91766	96.49135
##	[2653]	115.63330	100.67694	77.76894	96.65519	76.77102	111.13470
##	[2659]	90.72765	67.11299	113.20127	91.02246	112.93549	91.25336
##	[2665]	117.48575	86.39259	113.63668	112.91595	95.01419	88.85111
##	[2671]	106.40317	95.95531	122.38272	107.49086	99.74506	94.65962
##	[2677]	96.31853	102.20550	105.82161	116.33848	95.34792	113.59566
##	[2683]	98.00441	108.92324	108.46229	133.97654	105.95435	78.50778
##	[2689]	104.08361	107.22144	113.05126	103.93762	130.90949	77.20985
##	[2695]	106.47528	107.64788	110.38630	109.99189	101.96998	114.29000
##	[2701]	87.15214	99.52049	122.57973	107.28982	112.59747	80.76789
##	[2707]	113.12770	113.42735	90.96233	105.04550	92.40995	94.83835
##	[2713]	108.45486	114.75150	103.82197	109.29198	91.07940	89.80392
##	[2719]	118.45211	128.63042	84.40201	95.21959	104.53845	111.93203
##	[2725]	104.16343	109.17326	76.31529	96.40645	103.22976	109.81066
##	[2731]	89.57801	62.87088	92.46472	115.52716	93.20331	68.52767
##	[2737]	108.54451	112.65094	82.91730	78.32902	88.41530	91.73085
##	[2743]	98.45479	103.80681	95.59203	107.00435	79.81832	71.34668
##	[2749]	91.36172	90.00733	103.03653	99.35292	103.87504	98.70162
##	[2755]	97.58575	110.01075	94.39452	85.12971	110.74107	102.92641
##	[2761]	114.20849	92.63857	95.23431	101.48496	128.79229	83.83048
##	[2767]	102.80014	97.13130	103.89986	109.33762	113.25825	108.12232

##	[2773]	116.14166	104.42375	107.95248	69.30503	80.54193	89.41715
##	[2779]	88.79966	89.56345	81.54334	115.02828	90.21738	78.70406
##	[2785]	107.22975	117.51557	101.27924	74.32239	78.93885	123.67590
##	[2791]	99.66300	83.26771	93.13427	74.42663	82.60724	88.76338
##	[2797]	88.97549	138.89518	119.00835	104.10473	107.53808	93.38521
##	[2803]	134.73363	94.80518	103.20296	104.95800	87.35927	129.88240
##	[2809]	100.62927	109.81964	97.50603	116.29385	74.74633	79.65725
##	[2815]	123.76137	118.51350	110.48861	106.00456	105.51596	116.00208
##	[2821]	102.75008	114.93257	109.35088	109.98235	71.04417	107.75543
##	[2827]	106.58357	97.51239	85.62067	89.30265	113.09080	121.75046
##	[2833]	98.48798	118.07704	100.40468	58.38088	117.57260	127.64369
##	[2839]	54.86179	110.87144	115.12769	107.65591	117.21004	93.54680
##	[2845]	92.46439	94.15934	96.12555	108.51699	99.10560	105.72493
##	[2851]	115.19412	104.08639	101.64087	114.22924	103.66895	106.26883
##	[2857]	103.27492	116.13411	98.12556	97.12312	78.55797	94.24526
##	[2863]	116.94289	126.26112	101.41367	60.05450	128.39302	101.52481
##	[2869]	117.47854	97.66984	96.20930	98.84622	115.39608	93.62826
##	[2875]	78.69065	114.03631	112.01197	96.29239	83.81511	101.14326
##	[2881]	82.48013	85.81923	99.44157	111.47239	93.93914	119.03323
##	[2887]	124.64958	86.64266	103.42959	102.25044	116.15063	89.84503
##	[2893]	88.51715	110.82989	78.36444	109.56468	127.69927	82.45491
##	[2899]	114.52346	87.76247	94.52863	90.50975	105.02307	99.60553
##	[2905]	115.57155	107.52400	87.22096	108.48333	123.84162	115.85121
##	[2911]	95.75507	86.95505	105.87631	89.77905	83.73361	90.12793
##	[2917]	120.19950	89.04429	101.71824	111.40262	72.50979	106.19891
##	[2923]	111.52633	114.66251	124.26345	111.00033	112.01754	102.70966
##	[2929]	129.21762	98.71309	107.52647	129.13534	80.12150	106.67118
##	[2935]	127.98520	115.18467	102.69170	112.84760	90.94803	113.05579
##	[2941]	83.79144	87.43448	98.37379	120.61364	79.53968	99.15640
##	[2947]	116.49557	95.39210	111.96645	105.07228	90.16831	110.85975
##	[2953]	89.99303	120.77026	85.99609	104.13953	105.15410	123.98192
##	[2959]	89.78205	110.43138	81.52338	79.70719	111.70988	103.58120
##	[2965]	98.23593	102.91826	96.69533	116.59708	88.79426	106.98442
##	[2971]	63.23834	93.47370	92.20420	128.22099	92.13782	98.69187
##	[2977]	112.10395	93.55225	107.07623	128.44435	77.66059	109.17321
##	[2983]	120.00388	102.74741	85.65173	102.24977	96.68626	71.66476
##	[2989]	118.17541	103.40347	124.48131	99.25894	76.09421	103.15695
##	[2995]	68.78653	100.93389	76.75807	97.01148	90.97762	88.51391
##	[3001]	80.13206	109.70671	107.57803	101.51746	107.07713	100.17608
##	[3007]	110.07534	87.66774	107.80532	110.41957	81.10880	89.05630
##	[3013]	93.84622	80.42658	123.47011	114.33789	81.99213	86.71086
##	[3019]	112.56147	67.24735	87.83151	118.44262	99.75376	90.47834
##	[3025]	90.66328	77.86919	94.51708	107.54795	96.03214	86.51907
##	[3031]	107.70087	94.98666	103.36171	127.71622	96.54218	103.97809
##	[3037]	98.97259	99.97415	83.08951	111.17894	111.85319	76.92652
##	[3043]	66.99196	88.01652	86.41026	107.31250	131.72904	120.48584
##	[3049]	122.83227	108.84117	101.64242	107.16822	130.88237	110.12722
##	[3055]	111.30570	127.29121	120.39610	91.42622	106.85450	100.22712
##	[3061]	114.37580	106.09494	78.82632	69.46530	100.96503	90.70067
##	[3067]	81.02092	105.78052	117.18544	96.05437	107.72141	88.92994
##	[3073]	101.23160	110.48027	113.70974	112.38254	119.62468	139.89356
##	[3079]	100.89353	114.14606	100.20178	116.28756	112.22706	107.44533
##	[3085]	111.88358	129.11099	94.24625	81.57498	86.42527	96.40948
##	[3091]	107.31496	100.81817	100.12554	105.88543	87.49778	92.33820



##	[3097]	88.93593	113.19552	116.95926	94.40571	107.95407	110.82067
##	[3103]	106.08909	112.10479	108.66389	103.71228	100.80319	95.21953
##	[3109]	70.22772	105.07772	75.86775	113.91238	101.93360	140.29792
##	[3115]	83.40260	97.89256	83.94121	108.06443	87.56174	104.27848
##	[3121]	99.14275	77.52793	117.63945	68.05409	109.44186	80.86045
##	[3127]	78.10749	90.42497	115.13706	108.42564	93.22687	78.02000
##	[3133]	129.86959	92.41306	112.99788	106.70782	96.18736	110.97806
##	[3139]	82.87092	112.27290	109.73988	107.47602	111.30198	104.59990
##	[3145]	84.84467	99.03495	102.95085	100.96015	109.37540	100.92717
##	[3151]	102.96647	91.52895	97.35071	94.06827	106.28905	131.87466
##	[3157]	100.17159	113.60641	110.21930	96.83020	105.40894	101.45565
##	[3163]	92.68595	114.43680	78.62766	73.04052	114.45612	80.01829
##	[3169]	99.38375	105.55666	105.49608	84.57280	91.49634	86.29921
##	[3175]	96.22375	92.34051	94.15205	109.72802	105.58167	100.10518
##	[3181]	114.28995	80.37889	101.96012	101.00881	89.46555	81.92191
##	[3187]	78.13080	118.53470	101.41869	101.08654	113.30452	87.44819
##	[3193]	109.94317	95.45460	109.93097	119.98934	112.72740	108.21971
##	[3199]	104.70352	97.42825	114.44009	79.53287	88.37477	88.86122
##	[3205]	140.15081	92.53951	84.79271	109.12661	116.48998	108.64428
##	[3211]	101.33361	111.06489	111.42451	98.81285	101.79808	138.36811
##	[3217]	99.21864	101.74296	96.36331	93.65124	93.33539	99.22457
##	[3223]	81.29623	113.37753	116.65584	102.65687	112.42498	99.97720
##	[3229]	89.02988	90.22750	89.08240	102.59375	99.57813	74.75096
##	[3235]	93.29943	109.65341	100.85720	84.49974	93.67842	94.51209
##	[3241]	98.77132	88.31031	87.44285	93.19492	103.31992	100.05551
##	[3247]	100.79135	133.35281	83.67441	107.84484	73.23778	95.40982
##	[3253]	125.18939	100.57695	115.84240	101.93950	113.63573	88.92979
##	[3259]	114.71358	71.77708	91.18799	82.61456	106.87930	89.31131
##	[3265]	108.95012	118.93002	111.82601	121.47728	95.25566	116.74264
##	[3271]	111.97305	125.58680	105.09658	100.07969	80.87349	106.41384
##	[3277]	116.97716	110.46086	65.56822	103.42828	100.28331	102.97738
##	[3283]	111.50154	96.90463	113.59822	94.85176	119.14574	111.12201
##	[3289]	85.79327	103.83026	93.97455	103.56613	116.66946	89.65909
##	[3295]	106.54016	92.22679	85.11281	100.25754	85.17914	105.24667
##	[3301]	96.80345	91.86799	114.66065	95.56802	112.01065	90.52627
##	[3307]	124.05829	88.79031	100.32823	109.77223	83.91302	76.17220
##	[3313]	92.58206	110.48321	124.11404	88.18392	88.81292	99.56884
##	[3319]	103.95303	99.56132	103.89505	77.85785	72.97116	80.99475
##	[3325]	77.98572	94.93265	77.95989	102.44726	93.89062	104.20115
##	[3331]	104.80867	123.22882	95.79794	111.10234	116.62757	122.96262
##	[3337]	100.51793	111.22446	112.09790	80.24978	116.54483	106.67173
##	[3343]	96.20493	87.91519	97.89593	107.51066	90.57484	89.75302
##	[3349]	89.82288	84.66328	110.82914	106.92478	114.01900	122.69429
##	[3355]	96.43330	100.27229	108.05897	96.50855	159.98719	107.11620
##	[3361]	101.26394	90.08182	97.68485	86.32185	79.49202	129.63726
##	[3367]	85.52781	97.12796	77.06962	93.95379	100.44570	58.42219
##	[3373]	105.04444	105.49156	77.09931	115.02032	70.90235	75.34701
##	[3379]	108.19081	111.54389	74.30868	83.68674	141.15526	102.44168
##	[3385]	120.22684	113.79839	136.82044	135.95887	111.20558	83.08255
##	[3391]	89.11956	93.28165	115.00531	90.97515	107.78566	91.47194
##	[3397]	97.23220	97.67875	98.21639	90.24028	129.44172	57.49857
##	[3403]	114.09460	104.05138	100.62743	98.64681	69.62679	86.84855
##	[3409]	108.56273	78.47023	107.70362	137.04227	100.32815	116.67059
##	[3415]	117.63658	100.51388	79.13323	88.66736	107.08973	91.52315

##	[3421]	85.57461	107.20837	109.56077	103.35585	100.37131	108.07280
##	[3427]	112.52960	89.38595	113.08328	110.81545	108.80140	118.83534
##	[3433]	80.71098	91.18070	118.52381	93.47009	65.25252	115.69229
##	[3439]	100.26708	74.20748	111.05285	77.44252	94.58033	125.51362
##	[3445]	100.13742	107.14012	96.44020	108.69045	108.89052	75.72301
##	[3451]	97.09606	121.27036	98.14901	114.79221	97.85896	111.17284
##	[3457]	115.62212	98.34618	109.46926	100.27900	108.46767	86.45497
##	[3463]	100.24359	104.19306	105.40523	88.99553	99.58975	83.20899
##	[3469]	104.33304	95.16971	113.19053	72.70416	101.34853	77.75215
##	[3475]	75.37679	106.24443	96.49954	96.38411	98.76972	121.37170
##	[3481]	118.11050	112.11862	80.60593	85.55151	101.33719	99.91391
##	[3487]	97.49935	84.16299	99.21064	98.00788	102.99475	117.30844
##	[3493]	103.75176	98.08559	118.10379	96.59478	81.76515	110.50902
##	[3499]	120.74346	95.88148	96.97029	112.76787	85.78394	121.85633
##	[3505]	103.82229	80.29319	86.24462	94.09957	95.81129	103.42126
##	[3511]	84.88486	97.53471	128.77380	109.90839	100.42244	105.51484
##	[3517]	92.99756	119.32834	106.93571	86.66521	86.33885	135.63381
##	[3523]	94.58200	115.21018	110.08441	104.41570	96.32285	105.57656
##	[3529]	102.52452	116.35960	99.68989	77.61176	84.41618	101.46396
##	[3535]	131.45474	120.15697	130.14279	78.66664	96.22051	94.22984
##	[3541]	92.20857	112.39449	99.38708	125.61951	96.97468	129.75599
##	[3547]	120.19287	88.35564	86.88971	93.36301	112.43229	103.62997
##	[3553]	85.93725	119.16873	113.37099	77.84616	84.89483	113.83555
##	[3559]	91.85340	97.45258	83.57066	79.56739	104.24998	82.60804
##	[3565]	79.47399	112.67068	101.09041	92.29455	110.65348	101.72892
##	[3571]	95.91550	94.72267	80.29614	119.14731	119.11397	91.09078
##	[3577]	117.54702	95.08666	103.36457	87.98123	122.49903	87.05199
##	[3583]	85.13440	131.48653	100.60667	113.39526	86.04923	90.17109
##	[3589]	113.18498	102.05316	91.27215	88.44706	100.26800	85.13919
##	[3595]	76.86621	81.93516	85.94565	110.44297	120.47904	86.39156
##	[3601]	112.98478	93.00133	120.91136	99.85609	120.99267	105.13550
##	[3607]	81.56363	107.40489	111.35949	91.43192	100.24143	100.07685
##	[3613]	100.74849	94.69683	112.78630	77.46857	88.55730	107.21545
##	[3619]	100.67474	110.35928	78.00926	74.10235	102.53034	126.06697
##	[3625]	101.62752	123.87613	111.39073	112.76397	116.37157	96.80071
##	[3631]	78.88374	73.85032	111.45074	109.37237	82.40773	104.29712
##	[3637]	105.53350	89.48162	114.33898	120.41867	87.50291	123.53760
##	[3643]	93.70527	127.97894	89.92217	122.86475	126.20935	113.82843
##	[3649]	132.17072	76.23146	93.01519	115.68386	110.55829	104.87435
##	[3655]	82.25825	111.52495	104.08163	92.65914	109.66556	103.62481
##	[3661]	96.62832	115.03579	92.24358	102.35687	106.55892	121.84663
##	[3667]	118.24168	104.91891	78.32816	89.62338	83.20396	129.73082
##	[3673]	90.49261	104.13399	90.22849	96.07085	98.90332	105.66681
##	[3679]	114.58704	85.16122	88.90583	66.08851	88.94674	93.44161
##	[3685]	101.82715	78.30132	102.84927	111.77397	122.17997	88.93706
##	[3691]	96.29363	94.94293	89.17054	106.41506	130.36583	98.75815
##	[3697]	109.17460	92.66076	125.66147	101.76200	92.08909	119.07237
##	[3703]	102.49588	100.21848	94.64049	97.35620	104.65437	107.33209
##	[3709]	98.37419	76.90718	105.82837	92.68144	82.99234	98.27456
##	[3715]	77.24523	132.16120	85.23119	110.83881	81.06389	100.44978
##	[3721]	71.97549	93.59564	72.56616	95.99578	112.93750	96.12647
##	[3727]	77.51157	102.15186	82.79586	92.16281	96.11848	100.25726
##	[3733]	122.88057	98.21732	76.61077	125.35441	104.32940	100.59558
##	[3739]	110.92420	111.37456	95.34627	82.16384	104.18450	100.37023

##	[3745]	91.17182	102.39203	96.60664	107.36176	94.06669	61.61059
##	[3751]	99.68178	81.58567	64.15719	89.77247	79.10328	94.61303
##	[3757]	91.39930	89.92611	94.10385	97.74289	104.46674	131.38690
##	[3763]	77.05644	104.08674	120.19705	115.57433	115.88510	102.97175
##	[3769]	102.93369	89.17378	105.56802	98.66521	75.48037	93.56298
##	[3775]	112.28335	115.62988	104.01794	123.58895	108.48411	105.50831
##	[3781]	128.29426	84.29317	95.91091	113.94687	83.14028	89.60884
##	[3787]	92.56287	98.37649	115.33182	101.23401	95.94233	94.21419
##	[3793]	102.70296	125.33902	105.86281	101.34275	87.91634	115.62605
##	[3799]	116.87505	59.43288	113.07294	103.68892	91.85900	86.57628
##	[3805]	103.08441	110.43293	89.29788	114.73173	101.04777	109.95861
##	[3811]	82.34646	86.75355	94.31541	93.70924	79.93522	101.94450
##	[3817]	135.22325	92.11164	99.84053	97.38021	95.09372	105.09552
##	[3823]	93.26064	115.82208	79.56082	117.48879	117.40303	92.95684
##	[3829]	94.88436	98.13994	112.66445	94.33159	94.83773	105.92683
##	[3835]	113.26091	101.10900	101.01188	111.86212	116.95227	84.14327
##	[3841]	108.91576	93.88426	101.78133	108.40322	79.32869	112.25438
##	[3847]	86.72111	80.05425	88.45854	90.40754	76.03498	99.71744
##	[3853]	95.38963	91.35249	127.76225	103.50926	65.21697	117.84740
##	[3859]	90.51905	115.60749	104.19889	105.12947	78.93935	108.32079
##	[3865]	103.76831	82.30932	88.35767	108.98277	92.65630	111.70068
##	[3871]	93.98386	107.08204	115.28494	82.58852	93.58607	91.29322
##	[3877]	78.08059	109.71449	103.32910	104.07563	102.79149	100.11792
##	[3883]	72.14815	116.28754	80.78450	96.53190	103.15997	110.67418
##	[3889]	74.09344	125.55227	116.06673	94.92008	88.78040	102.72399
##	[3895]	122.01875	93.46438	76.85330	117.78019	66.54292	96.72917
##	[3901]	117.12330	102.88803	104.61658	119.21457	99.64732	112.42866
##	[3907]	96.23882	50.54308	61.78929	99.05603	88.11944	102.38049
##	[3913]	116.47697	99.09469	91.90199	78.66282	103.50077	117.75166
##	[3919]	83.84918	77.72241	106.70333	137.18196	96.63465	123.58312
##	[3925]	116.62012	97.57007	105.25564	86.11307	108.22723	72.27883
##	[3931]	114.23413	100.78690	83.39380	101.75709	97.35304	107.82224
##	[3937]	101.07071	102.49618	89.82962	117.70834	122.72592	91.60716
##	[3943]	98.16534	112.81324	90.95231	103.38962	87.65839	86.04765
##	[3949]	87.87769	91.19780	71.75283	81.05220	101.51970	87.92212
##	[3955]	87.11616	100.47636	79.71074	94.48175	113.69217	99.31837
##	[3961]	119.61522	123.25670	94.85942	83.58004	85.40357	99.75105
##	[3967]	94.10377	108.32285	98.96673	85.01434	103.56680	108.17888
##	[3973]	97.13114	115.35480	124.54227	108.20798	100.21013	98.54402
##	[3979]	106.71664	111.27334	116.06437	92.88354	98.57809	102.99453
##	[3985]	122.11177	91.00380	95.05889	100.46159	87.03188	97.17564
##	[3991]	93.74655	95.06205	105.09262	83.40166	93.07402	93.77247
##	[3997]	108.99455	91.82310	84.80109	84.76697	111.39691	114.44178
##	[4003]	106.29592	99.08879	109.28559	110.19073	94.70625	108.50210
##	[4009]	88.08147	100.86949	95.60438	120.12551	87.87682	87.81607
##	[4015]	94.56194	102.30173	82.05892	96.35126	95.58259	96.06084
##	[4021]	104.35115	90.17193	93.07392	93.93473	108.53177	87.66685
##	[4027]	90.85868	91.08848	101.82892	102.37070	74.80456	82.44911
##	[4033]	101.49216	92.11407	86.59492	96.67969	100.38248	119.86694
##	[4039]	85.84620	95.02589	96.59917	83.72356	78.06484	79.82144
##	[4045]	96.75714	100.38647	112.27961	87.63457	119.08129	86.15194
##	[4051]	130.92358	97.63683	96.73251	93.69952	96.54097	122.69625
##	[4057]	101.62076	88.09455	122.72091	105.33797	113.20532	110.07578
##	[4063]	98.19851	118.73130	104.67831	91.57375	95.94673	94.01156

##	[4069]	66.34204	108.56971	86.13601	79.11407	91.70656	111.79622
##	[4075]	116.39888	91.35466	94.32032	102.73032	109.56590	97.23754
##	[4081]	101.76733	99.49493	95.22960	127.09746	101.36332	98.74062
##	[4087]	113.56240	109.21602	80.33540	98.65596	120.23862	99.02651
##	[4093]	104.54090	108.95332	106.85597	110.53377	104.96804	99.57353
##	[4099]	97.67395	129.52083	86.14500	114.81016	116.39732	92.40759
##	[4105]	74.58033	81.41323	111.26254	97.43157	71.16998	100.30536
##	[4111]	89.90233	88.62858	74.78850	93.63788	93.61597	90.82968
##	[4117]	104.92626	108.11371	117.05656	65.90423	114.10905	96.92704
##	[4123]	74.99874	93.94424	106.77384	89.95005	109.18667	103.88366
##	[4129]	79.60660	72.57463	91.66246	93.61929	93.14712	87.06380
##	[4135]	116.30330	95.94558	92.54825	87.37393	137.81919	116.64471
##	[4141]	100.60142	88.51507	114.20488	116.32537	96.81209	86.75507
##	[4147]	79.07284	90.92077	97.57577	99.00143	87.14661	109.70406
##	[4153]	70.91066	105.35116	98.19578	74.46868	81.67389	93.80417
##	[4159]	115.75925	80.20467	118.88140	87.14713	97.06562	109.47170
##	[4165]	83.81111	120.22026	93.91244	92.14240	108.40501	96.22452
##	[4171]	100.69216	119.06262	114.52123	102.18724	110.05981	94.85774
##	[4177]	88.61472	101.85689	123.85631	108.27228	112.69761	110.95766
##	[4183]	85.26923	102.61130	115.67966	123.29391	70.74135	80.51515
##	[4189]	106.89324	122.73629	106.54684	100.52922	113.07625	106.50441
##	[4195]	91.92734	96.23527	125.09427	96.07111	114.76450	93.88308
##	[4201]	109.52421	101.79259	76.34661	90.84664	73.82926	103.38328
##	[4207]	89.32050	101.85403	63.86205	88.28935	93.10567	104.95090
##	[4213]	130.84842	91.47594	112.80486	84.58958	70.36376	110.62478
##	[4219]	117.70745	79.06368	81.90067	92.49353	95.14686	78.09306
##	[4225]	101.94869	114.57554	83.33426	105.71980	109.26075	84.44455
##	[4231]	96.85559	88.82096	93.71454	98.60991	90.81204	105.73895
##	[4237]	72.34776	100.54487	88.23429	118.67562	92.33267	110.88625
##	[4243]	137.22096	102.03245	110.46906	82.85022	83.81111	129.63113
##	[4249]	130.59433	102.50038	86.72479	95.75091	147.88113	80.94074
##	[4255]	99.87430	110.66692	111.23903	120.64864	70.34399	82.34285
##	[4261]	74.05284	115.50264	93.46088	75.49850	98.83966	92.77459
##	[4267]	97.15785	80.41338	96.40646	100.25055	105.65003	75.81381
##	[4273]	106.66640	116.67646	96.23200	129.70514	110.63994	92.05269
##	[4279]	92.39765	109.91735	88.14796	89.90691	85.64379	93.37130
##	[4285]	105.06592	110.88412	72.77608	106.93466	112.49760	129.21574
##	[4291]	73.41992	80.80819	87.50216	99.20414	82.89444	88.18928
##	[4297]	96.08028	90.54472	110.18781	117.34345	110.01805	94.00852
##	[4303]	88.70918	111.93381	79.81507	97.58907	106.84684	82.71789
##	[4309]	110.36207	120.81224	91.54238	89.62149	95.17127	102.42704
##	[4315]	127.70247	111.18604	66.30909	88.30766	86.38003	84.21316
##	[4321]	128.97161	110.69165	103.31060	85.83514	69.88903	120.75054
##	[4327]	115.16648	111.19629	112.31712	123.65858	98.14794	90.81904
##	[4333]	111.07486	129.09966	108.66585	103.44844	121.96863	96.52240
##	[4339]	92.61907	55.66861	128.15523	102.97648	97.06318	119.81619
##	[4345]	87.02888	118.40797	90.55127	105.78620	112.64781	119.17842
##	[4351]	91.05035	123.61815	103.56230	98.99016	97.15677	117.38810
##	[4357]	114.55997	87.72041	136.17940	92.43930	80.53865	81.40785
##	[4363]	92.95131	129.53164	125.13267	91.81351	105.49642	134.58969
##	[4369]	82.30778	101.72021	81.39619	77.70186	101.99948	104.91785
##	[4375]	128.03577	110.73027	121.23718	105.59199	103.77920	113.59977
##	[4381]	94.06302	95.27832	109.42365	83.25687	107.60957	86.75921
##	[4387]	120.96705	110.80362	95.00798	130.54823	107.86140	111.06630

##	[4393]	85.90027	74.72588	114.49118	75.94990	90.91360	79.76732
##	[4399]	118.50158	92.24517	89.10863	127.52079	103.05709	81.32989
##	[4405]	111.52240	102.90370	98.20630	84.58687	108.19585	97.15462
##	[4411]	117.02707	104.90762	113.32419	93.17516	106.73182	91.29316
##	[4417]	108.83098	98.74602	88.24839	106.87385	115.56526	99.68133
##	[4423]	85.82206	104.64451	80.14241	87.90866	98.59217	93.06492
##	[4429]	78.03840	80.86865	127.31503	109.85687	80.38289	95.51313
##	[4435]	92.52376	82.45127	85.87284	89.97478	101.97362	96.22349
##	[4441]	130.79898	143.14127	81.26220	106.52517	96.81088	123.02770
##	[4447]	106.78709	98.94167	85.30941	114.06632	110.43310	121.39841
##	[4453]	137.79783	84.65714	107.75481	93.58447	91.63663	101.90704
##	[4459]	119.16514	81.03222	107.73161	103.45095	106.61802	104.48008
##	[4465]	110.74301	85.32733	91.09851	92.64481	113.70776	60.48602
##	[4471]	119.91500	103.77070	104.92790	87.08131	106.57539	77.99359
##	[4477]	113.48762	102.59774	86.47703	126.64242	98.37556	80.36898
##	[4483]	107.90752	109.54784	99.26468	85.53133	72.79994	87.34660
##	[4489]	106.21615	101.30502	94.46680	114.34758	107.46569	84.97575
##	[4495]	120.96239	71.06713	84.18736	92.14693	116.43527	94.67257
##	[4501]	104.16427	112.30594	96.01956	101.52630	90.11272	112.86731
##	[4507]	63.33710	98.08294	126.32675	115.38307	95.08181	98.13507
##	[4513]	102.35081	118.13702	120.62669	102.95290	88.26701	92.08041
##	[4519]	133.09545	98.19757	101.08023	104.36991	133.99467	110.67390
##	[4525]	102.62384	104.18396	121.69429	100.46871	95.48521	101.46632
##	[4531]	73.68677	86.11957	87.18474	94.01914	94.48138	89.92105
##	[4537]	108.99867	108.34624	98.29730	114.72675	91.61255	87.54669
##	[4543]	85.46671	77.94169	100.10430	102.54467	98.73490	109.24408
##	[4549]	116.15684	96.94283	90.00369	128.55506	119.41874	93.38544
##	[4555]	109.75231	92.59049	100.80320	71.72877	66.80321	117.71920
##	[4561]	92.42158	117.05474	94.44575	108.01616	104.98902	92.54843
##	[4567]	94.68680	97.66934	108.47966	93.12249	115.35060	91.64693
##	[4573]	102.96961	79.79833	100.05100	98.61752	74.82033	102.62267
##	[4579]	92.99328	87.94740	87.96580	106.14304	82.89786	96.44286
##	[4585]	91.44118	87.67218	76.44324	93.24708	100.61382	122.90366
##	[4591]	104.76327	98.95013	127.63984	112.05005	90.88419	111.65239
##	[4597]	103.47729	103.35220	88.53766	82.12403	97.89589	84.15731
##	[4603]	102.52799	110.27773	113.09913	87.48604	107.36772	86.03403
##	[4609]	116.04248	114.37163	130.24456	112.18221	95.39056	119.81374
##	[4615]	114.03770	77.86505	113.00303	109.11460	87.85295	97.53300
##	[4621]	101.73508	121.55088	113.58303	73.15014	118.71125	98.66944
##	[4627]	127.31341	87.95770	83.70382	117.56123	99.36894	97.64183
##	[4633]	122.47334	85.67659	113.66360	97.23167	94.18934	70.94463
##	[4639]	95.66184	82.46607	89.72062	125.13268	87.58596	92.26602
##	[4645]	111.87805	102.27169	92.94016	78.59610	84.77760	108.06847
##	[4651]	98.53128	113.39529	104.90005	104.91752	116.66240	121.54604
##	[4657]	90.17187	111.45317	107.34537	118.78203	106.61986	88.83788
##	[4663]	85.62109	116.70776	98.56395	97.55538	110.46940	91.68175
##	[4669]	113.11665	83.44713	92.74588	117.38538	122.05463	106.30501
##	[4675]	100.84848	99.28148	119.35018	82.14976	95.50597	99.22143
##	[4681]	119.14958	112.67211	92.05412	96.08530	96.63664	103.22393
##	[4687]	91.58210	114.34729	92.54059	110.14185	107.82927	102.03270
##	[4693]	77.76729	107.67969	107.87852	102.80292	81.04625	83.90075
##	[4699]	111.92273	100.93155	96.82849	81.09851	103.05157	129.85090
##	[4705]	93.01832	82.78971	94.19254	113.79045	116.31355	69.47544
##	[4711]	105.53836	78.23632	86.87556	114.86127	95.54444	100.63688

##	[4717]	126.24663	109.80901	122.59736	109.19714	106.06895	103.56546
##	[4723]	111.14729	74.74879	107.84665	101.43537	112.47223	90.29474
##	[4729]	112.00348	112.20550	112.91065	75.97837	65.85364	114.42707
##	[4735]	124.65094	119.42391	94.75158	94.63528	100.34234	110.50369
##	[4741]	110.35526	101.33652	91.07154	91.81003	108.07971	133.25832
##	[4747]	111.40275	84.64128	103.68732	105.69730	99.49116	141.28456
##	[4753]	90.23295	128.38894	110.33975	70.44533	84.75510	90.01447
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##	[5701]	133.45294	120.84498	92.57520	107.97086	100.79179	104.91952
##	[5707]	120.42942	111.47267	108.53431	97.67474	118.50793	117.29645
##	[5713]	106.98748	97.49816	85.42907	112.83104	88.13683	124.73114
##	[5719]	80.45993	102.59107	78.09802	113.54938	95.63890	109.60814
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##	[5731]	104.47696	92.40850	117.12722	79.07675	100.70941	90.30698
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##	[5761]	93.38006	95.96416	96.88492	72.90458	107.00466	102.79241
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##	[5971]	107.26738	81.83896	95.53586	92.87418	108.77565	117.24099
##	[5977]	93.38093	82.53175	92.57643	128.10756	95.05790	125.54269
##	[5983]	93.97724	101.68528	97.00150	100.29433	108.90097	90.58165
##	[5989]	83.10118	86.48451	106.17311	89.74732	104.96219	92.46243
##	[5995]	110.03476	108.21580	101.70063	119.13708	104.56332	107.75086
##	[6001]	72.62364	110.62893	116.78413	84.66356	120.25446	106.96294
##	[6007]	110.90585	100.32902	109.29895	101.76454	130.42833	78.13063

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##	[6337]	86.25731	89.28879	92.76463	100.73124	99.35219	123.61745
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##	[6349]	128.65760	102.52397	102.34816	114.09243	110.50048	64.22071
##	[6355]	101.93453	71.47715	102.91519	61.18270	83.27614	117.35535
##	[6361]	116.78473	104.81643	98.48730	80.93974	65.89821	77.38534
##	[6367]	87.08166	84.33111	91.40409	86.40993	110.56439	102.18819
##	[6373]	78.59768	86.34454	92.30032	100.12394	102.97373	110.34691
##	[6379]	68.77100	117.58947	101.13464	108.17671	102.27667	89.81982
##	[6385]	85.26464	155.27826	113.05249	81.30264	91.12918	96.68072
##	[6391]	111.94427	73.58794	125.59496	94.27031	92.04758	115.70508
##	[6397]	73.10902	99.65875	105.28259	78.72478	113.25226	100.44033
##	[6403]	81.87477	107.39763	99.75804	102.69145	102.89357	89.66903
##	[6409]	104.90859	93.98115	110.73537	76.30318	107.51483	117.59345
##	[6415]	96.02660	103.89939	103.98113	84.14438	89.08416	111.71877
##	[6421]	111.88296	91.51843	90.69852	120.13870	107.82808	110.72621
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##	[6445]	93.25600	88.23748	84.18142	110.00736	92.78795	102.62299
##	[6451]	100.34391	109.16627	93.89717	100.62838	120.76630	102.81938
##	[6457]	95.29651	109.01263	97.60129	68.89468	113.95026	117.87893
##	[6463]	102.99558	96.74779	131.57600	70.54769	112.22304	122.07525
##	[6469]	104.00501	127.77472	116.71905	92.44004	114.60251	108.24686
##	[6475]	113.65469	79.45035	86.49113	83.58758	104.46209	112.07948
##	[6481]	70.88874	102.13549	122.19848	110.91826	77.01393	93.04512
##	[6487]	91.45161	97.46031	70.80239	113.39982	105.02027	94.74710
##	[6493]	134.39515	117.25135	117.76095	119.63469	90.80314	102.76760
##	[6499]	119.62077	95.36913	72.65774	77.37456	103.99894	113.14643
##	[6505]	46.46994	95.33419	85.00549	82.83928	132.98860	93.49203
##	[6511]	93.81521	88.06399	95.12920	106.35833	68.65065	113.68840
##	[6517]	106.36316	80.97474	97.76292	71.49708	93.38404	82.34160
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##	[6529]	90.31273	84.25127	93.04561	111.13360	108.53339	101.96871
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##	[6541]	125.42140	115.51287	114.83836	106.29754	92.08604	111.87728
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##	[7105]	123.35888	93.34403	96.49615	116.19130	83.02424	86.33942
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##	[7249]	78.53069	107.22680	88.97920	91.04145	79.07403	96.29454
##	[7255]	91.93039	98.58985	113.65009	88.44665	102.34437	129.05311
##	[7261]	98.56176	122.41561	81.50493	85.96276	92.93056	98.93030
##	[7267]	100.42260	105.64252	96.48095	98.43813	117.27301	125.93370
##	[7273]	99.57933	91.58133	80.22977	119.20681	93.71920	95.06323
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##	[7285]	102.57889	102.82553	77.39505	102.66876	113.57139	106.09793
##	[7291]	89.10464	100.37338	65.06521	88.94552	96.05065	93.19029
##	[7297]	100.12758	114.04009	124.91881	136.01708	95.51686	90.06141
##	[7303]	92.10291	116.23119	118.97888	82.59248	92.88385	115.87693

##	[7309]	88.17268	99.25913	113.56979	104.85829	97.90606	117.98338
##	[7315]	100.25935	78.03081	103.62410	76.94218	93.45285	78.36669
##	[7321]	92.14477	102.65697	97.08674	108.04748	110.82161	102.03588
##	[7327]	109.42773	109.11063	130.87862	106.96017	106.51008	130.03377
##	[7333]	101.70186	104.70006	113.51883	94.18462	93.02868	102.55177
##	[7339]	96.98546	76.25640	112.27076	86.12995	87.59980	97.28786
##	[7345]	91.99120	108.75938	108.38109	97.04773	89.67221	87.36648
##	[7351]	114.54982	93.59789	95.04080	125.81255	77.01826	106.86038
##	[7357]	103.09203	81.91564	101.11532	91.96837	130.16508	115.20527
##	[7363]	103.30571	115.11483	95.13745	100.28852	72.17749	90.00984
##	[7369]	76.15080	95.26682	87.15121	105.13721	61.24219	96.07884
##	[7375]	103.26990	124.92155	105.10117	95.67608	92.06139	124.65905
##	[7381]	112.82343	118.87982	82.91952	88.66016	99.53563	71.92463
##	[7387]	135.36417	102.47857	80.82389	85.71079	109.29686	118.79339
##	[7393]	68.35747	104.29463	103.50716	84.16068	111.75989	102.20469
##	[7399]	66.50248	90.42072	127.90773	98.11224	97.69272	93.20412
##	[7405]	85.27151	100.58936	112.41217	91.96938	96.85007	104.44465
##	[7411]	96.88933	96.04976	120.85199	56.67578	103.34729	104.37158
##	[7417]	98.20080	90.80476	136.08590	96.46331	99.46313	110.96224
##	[7423]	108.43051	75.69559	104.04811	107.22306	101.56359	72.57905
##	[7429]	80.03852	117.81835	126.75345	87.25780	99.12145	109.19730
##	[7435]	87.75831	110.22474	126.51223	95.56950	110.00729	103.46729
##	[7441]	98.31564	93.70718	98.14961	96.23780	101.82442	93.46084
##	[7447]	114.49391	97.98095	111.28052	101.22213	96.72450	99.40457
##	[7453]	101.52326	107.70433	120.62315	96.51009	81.00110	114.09157
##	[7459]	100.42231	113.18084	80.86972	116.21912	104.40074	82.86596
##	[7465]	136.96284	117.34509	133.97021	130.75933	108.11808	91.65957
##	[7471]	121.74420	110.58639	73.70200	96.68490	94.54946	99.28476
##	[7477]	108.87824	103.26698	64.43807	103.74457	78.27946	110.05662
##	[7483]	65.59385	123.30009	68.02851	107.44296	119.30651	115.51941
##	[7489]	102.62047	85.37590	104.32066	77.49964	115.43309	104.68535
##	[7495]	90.02311	101.40911	108.59883	120.37723	76.67281	71.91689
##	[7501]	104.79176	86.84913	93.83990	98.10618	100.90060	109.10968
##	[7507]	77.59546	114.01441	114.07723	76.39685	94.94580	97.76312
##	[7513]	121.29509	98.46066	84.74048	128.00378	120.52820	96.51105
##	[7519]	106.14134	97.10421	107.78606	108.76999	120.57281	84.05501
##	[7525]	106.79163	105.74805	103.58631	109.07741	89.76952	106.58596
##	[7531]	113.32714	78.29965	98.88089	109.18853	100.44008	105.51260
##	[7537]	104.91853	106.50226	108.68683	100.94659	97.14067	82.76467
##	[7543]	102.31399	114.05663	124.00847	116.64812	93.85209	88.76596
##	[7549]	104.85574	103.76729	92.89514	92.92355	95.54497	85.21249
##	[7555]	94.38638	99.90203	115.32419	113.72883	115.56161	92.80329
##	[7561]	109.19245	97.43542	99.01518	106.27888	108.31448	99.91302
##	[7567]	89.27391	133.16995	100.64021	87.90666	112.71309	109.01524
##	[7573]	104.62693	90.81197	96.07627	99.45482	78.95149	99.97895
##	[7579]	113.85110	76.28064	95.59278	88.36308	112.44538	78.71135
##	[7585]	108.16084	87.33939	85.97911	104.37811	109.68726	94.97688
##	[7591]	105.35347	95.93156	90.35266	93.85684	91.19488	90.38094
##	[7597]	85.56248	122.93798	97.87341	84.42192	93.10836	86.97428
##	[7603]	94.79264	74.81415	62.55539	140.55041	80.60745	90.31806
##	[7609]	88.84365	108.29577	97.49143	122.10281	89.32361	100.10771
##	[7615]	104.29427	121.23261	108.48564	98.97090	115.38945	123.49184
##	[7621]	111.29199	101.99698	102.17994	116.08030	125.97000	128.27541
##	[7627]	109.46431	105.25607	94.66277	76.92477	91.66845	113.38226

##	[7633]	96.18614	86.91830	120.85970	112.80956	104.80436	105.95575
##	[7639]	69.55478	114.75929	115.37790	96.98993	95.23236	90.62423
##	[7645]	110.02059	79.40010	99.79157	99.44073	108.16350	91.08539
##	[7651]	109.36458	123.90815	118.69637	83.42316	84.48272	88.77055
##	[7657]	108.13963	102.57436	88.64470	71.60011	101.34782	91.07678
##	[7663]	111.47213	103.77806	105.09163	99.55267	110.41750	82.85928
##	[7669]	92.08664	93.05418	81.40033	73.94127	74.55836	86.66377
##	[7675]	111.17395	107.95558	89.17706	89.19780	126.90499	105.09248
##	[7681]	112.65480	92.96737	117.51691	99.31025	109.02987	92.71399
##	[7687]	102.80076	108.15472	97.32778	91.73325	77.30614	94.32748
##	[7693]	94.15703	85.84370	137.72090	116.05214	101.01844	92.69618
##	[7699]	104.95272	91.83211	88.10501	90.06895	107.38951	100.92706
##	[7705]	90.95630	90.90833	83.40080	126.00001	113.51819	75.08466
##	[7711]	104.55976	108.66092	99.03913	116.29426	104.06815	101.80850
##	[7717]	107.42062	92.06522	108.90965	85.27955	94.58032	101.64409
##	[7723]	77.51015	86.24732	113.34390	112.34094	95.27253	75.19523
##	[7729]	123.62404	110.01651	117.40990	98.43576	130.47542	74.54978
##	[7735]	84.00928	85.02757	114.46434	83.96489	113.16836	76.07047
##	[7741]	85.17164	117.10599	116.56069	122.18664	79.17304	94.94991
##	[7747]	122.29184	85.50181	102.98622	78.14054	121.55283	78.46489
##	[7753]	116.24359	116.26313	87.90257	113.74351	98.40259	94.37438
##	[7759]	120.56791	102.25109	114.82177	116.24125	98.85117	85.03605
##	[7765]	107.29039	104.34090	140.78897	80.30467	93.96261	102.67493
##	[7771]	95.89623	108.14096	130.45111	99.97038	99.88134	99.74411
##	[7777]	117.94900	121.66790	81.70852	85.81608	92.81530	105.59000
##	[7783]	86.28601	78.16157	99.58054	95.24370	72.56601	98.20240
##	[7789]	92.76481	120.46728	105.58182	83.23439	115.19569	88.64448
##	[7795]	80.16064	98.05137	154.60596	96.92902	93.62720	77.62643
##	[7801]	69.72008	92.15131	93.80450	99.76025	99.64871	93.20848
##	[7807]	112.58732	84.02505	119.23015	76.37234	57.17022	83.54151
##	[7813]	74.57811	112.20033	122.94149	94.37186	75.34467	79.77883
##	[7819]	112.00374	84.69926	69.88237	81.90664	98.90106	125.39966
##	[7825]	103.23663	75.92770	115.76545	115.07560	74.40678	79.33714
##	[7831]	100.26120	106.33432	113.17106	110.80880	90.71536	65.95560
##	[7837]	120.25066	89.40067	64.79181	91.78501	111.20741	92.32084
##	[7843]	91.69817	104.75952	87.38467	84.75784	74.24637	71.55057
##	[7849]	119.24817	100.88220	87.78232	108.01489	116.67347	117.80022
##	[7855]	69.82937	129.61440	105.23470	101.91166	113.91747	116.91132
##	[7861]	109.74560	103.83878	116.55986	83.80697	90.59609	101.85912
##	[7867]	102.33307	76.31224	81.96331	107.49953	89.86357	64.74517
##	[7873]	101.95085	109.31006	84.67870	102.16427	115.98709	115.03476
##	[7879]	100.08621	86.78402	99.37306	115.51178	92.60660	90.21230
##	[7885]	98.31428	114.70890	106.28899	107.51455	93.85778	116.70049
##	[7891]	102.41113	91.79261	115.19209	109.67428	75.79535	91.47689
##	[7897]	90.51510	106.65637	131.93700	103.07847	112.54888	87.13434
##	[7903]	65.40478	102.00619	97.78932	119.86657	69.05803	87.95408
##	[7909]	80.20832	86.10609	87.54069	111.83439	124.05315	97.36029
##	[7915]	98.95245	111.14771	90.01420	97.51687	108.68277	94.09693
##	[7921]	113.03690	114.34095	111.41748	129.61537	92.36818	95.92461
##	[7927]	86.28066	112.67655	84.38768	115.59896	104.04375	84.04134
##	[7933]	108.66824	119.55191	120.66140	101.90890	116.02095	93.08407
##	[7939]	108.16114	92.39521	91.82769	101.41280	103.71289	103.27701
##	[7945]	114.81166	100.79448	122.36862	101.71772	111.51609	107.38440
##	[7951]	108.65659	120.31435	88.61897	97.70080	135.04239	119.49372

##	[7957]	121.81553	99.85067	87.29684	101.19263	109.67432	131.47814
##	[7963]	86.65650	114.70057	93.74825	86.33805	105.84151	94.82853
##	[7969]	81.74915	105.63231	108.27686	86.49186	105.84385	90.04152
##	[7975]	98.45721	100.08581	80.51886	108.70276	116.55853	77.61849
##	[7981]	121.48098	105.05345	99.30867	104.79632	102.34070	71.74643
##	[7987]	82.84451	87.54442	97.32809	90.60392	118.01702	88.41538
##	[7993]	119.92480	91.35401	110.67286	101.68093	94.17509	124.43370
##	[7999]	91.18350	85.74904	105.77625	95.45856	86.37800	110.50489
##	[8005]	97.98788	111.48025	79.78078	93.74094	97.56803	83.71722
##	[8011]	105.69200	91.24427	101.64211	99.71940	123.61336	92.99399
##	[8017]	78.61218	75.15149	93.36163	130.96290	111.32790	92.05346
##	[8023]	97.00557	81.28710	89.16519	105.32202	111.99165	123.96170
##	[8029]	94.68583	81.47448	98.11041	101.05897	114.35178	102.40753
##	[8035]	113.18987	108.07696	92.09990	86.57198	120.19864	93.45283
##	[8041]	113.25651	114.19016	77.75228	104.87279	108.82325	105.21445
##	[8047]	80.19045	100.27213	89.47940	126.66103	107.32888	108.07725
##	[8053]	110.26763	109.39917	125.22086	95.66592	105.61092	93.07763
##	[8059]	90.68857	100.82430	115.47510	105.64399	132.35230	104.56841
##	[8065]	97.65424	84.98560	85.62947	99.62548	74.86912	107.30110
##	[8071]	127.22911	94.80209	100.78141	124.64188	101.86490	59.35078
##	[8077]	85.45232	86.03750	94.76477	83.96172	77.49578	131.88068
##	[8083]	117.11978	115.99561	83.54807	88.21487	104.84552	107.23294
##	[8089]	140.08712	88.24719	79.59263	112.82767	81.79216	84.53139
##	[8095]	101.47415	107.83529	83.32182	124.33367	81.49181	91.17343
##	[8101]	105.43931	90.84149	111.14762	92.15935	113.79923	110.65058
##	[8107]	92.27375	110.80680	75.85878	106.23291	71.10445	76.02535
##	[8113]	109.88956	96.11023	117.36107	104.58859	98.33783	119.76774
##	[8119]	112.93595	103.14442	81.99377	91.55976	123.63903	114.32417
##	[8125]	120.03012	98.05369	114.79664	102.53217	84.18947	103.30938
##	[8131]	114.65197	125.87163	107.31617	100.41108	93.74082	76.15928
##	[8137]	84.69310	105.65751	89.34797	95.41767	91.74878	106.51863
##	[8143]	68.43772	77.79743	116.93588	88.59333	113.93724	123.81360
##	[8149]	114.91123	93.66592	84.07899	90.80217	100.11207	139.93425
##	[8155]	97.93087	79.71975	99.84824	66.03148	112.74764	82.84063
##	[8161]	92.59628	116.63644	88.93598	83.56736	113.49324	105.20036
##	[8167]	106.70778	111.84827	99.40910	86.42934	109.89883	74.85962
##	[8173]	92.47346	103.09082	112.23161	85.66937	106.72870	85.50899
##	[8179]	96.56479	100.79056	100.02426	86.56118	101.00901	120.65252
##	[8185]	86.51331	100.54140	97.95484	105.12372	128.44462	108.29859
##	[8191]	78.85998	108.76735	104.09999	100.02452	123.87231	104.39650
##	[8197]	93.68634	93.30580	69.72578	107.81909	97.91979	99.38607
##	[8203]	104.41689	82.84890	103.31184	82.04418	109.61841	120.52825
##	[8209]	110.41641	98.42710	92.15063	90.91587	121.30289	101.46262
##	[8215]	108.05700	90.42218	79.91890	106.03045	82.94435	85.75395
##	[8221]	92.72724	91.21297	115.00047	98.12392	95.94712	124.58074
##	[8227]	75.33108	92.18399	88.02298	106.53480	80.91015	96.58755
##	[8233]	108.93626	90.77277	97.52548	94.80610	85.02123	98.98014
##	[8239]	98.96395	89.40682	78.20387	98.07920	93.93043	98.33941
##	[8245]	111.87006	99.91162	136.78731	104.64674	100.71311	108.40230
##	[8251]	82.40234	105.12339	128.15215	92.96463	88.66919	97.84592
##	[8257]	111.58128	107.97177	103.47638	90.10638	104.80223	105.07446
##	[8263]	122.38689	100.22365	80.18520	97.10035	75.26590	95.91444
##	[8269]	126.84022	92.18920	122.40699	101.61080	94.51140	102.83803
##	[8275]	116.78791	82.69098	92.47138	111.74817	89.43836	108.48681



##	[8281]	96.05714	86.95890	117.99274	96.70987	56.24961	84.06495
##	[8287]	83.53217	112.90692	108.75831	92.94678	94.25718	109.98030
##	[8293]	108.88707	95.18915	114.71075	105.59019	106.80199	85.66644
##	[8299]	91.07602	94.06366	94.05307	119.81047	98.23992	105.23876
##	[8305]	83.45997	112.90902	101.86964	105.90305	133.69369	114.80341
##	[8311]	94.11207	93.44428	97.50515	98.58825	90.33174	95.12520
##	[8317]	105.87531	119.43723	97.80173	113.18400	111.89678	121.35318
##	[8323]	93.03988	92.90332	109.42497	114.79200	105.57070	104.15072
##	[8329]	109.01015	105.34524	116.20650	96.61490	104.31989	97.89492
##	[8335]	62.55196	118.10470	96.77323	96.04418	116.48939	111.60618
##	[8341]	102.03542	94.13635	83.16668	108.08396	94.27046	119.77584
##	[8347]	88.40667	99.49009	117.89357	112.62328	109.63167	102.74387
##	[8353]	82.53393	106.94627	114.63471	98.51439	89.37237	88.27531
##	[8359]	74.24278	118.99668	59.08691	91.81013	112.91997	73.57059
##	[8365]	82.78113	118.28777	90.78176	93.11188	86.84782	95.05545
##	[8371]	80.13245	91.86373	89.31331	92.71007	64.84824	115.79926
##	[8377]	109.91957	106.58072	95.87191	94.70037	112.18022	117.00619
##	[8383]	76.45391	96.20333	96.23797	123.38289	108.75104	98.35627
##	[8389]	121.85533	101.49810	97.15802	76.58146	92.90936	102.87885
##	[8395]	105.20832	95.29144	129.66585	98.80569	101.19837	88.89304
##	[8401]	96.55716	127.13916	93.97400	105.20882	80.44203	78.09657
##	[8407]	90.11242	82.21769	94.51163	132.75415	115.71031	101.75454
##	[8413]	92.34162	81.80584	96.06393	135.18586	106.93829	106.90844
##	[8419]	98.76576	81.72375	90.79923	95.16689	112.15154	98.88797
##	[8425]	106.15173	77.95058	89.79475	104.69252	107.12313	94.16868
##	[8431]	103.97191	88.56724	77.68947	109.28989	95.38943	112.64626
##	[8437]	70.96005	90.85953	106.58215	108.36753	92.47381	137.96644
##	[8443]	93.32729	79.71929	97.68859	97.63119	115.86350	94.09051
##	[8449]	126.61379	105.33188	111.89534	124.05458	124.85670	119.17088
##	[8455]	95.69674	93.44026	98.16627	90.26519	106.42454	66.77291
##	[8461]	64.05250	105.75669	113.73170	91.93273	87.45246	102.80954
##	[8467]	87.83782	104.15650	97.03420	108.62253	89.79335	109.50487
##	[8473]	105.93041	106.34396	108.60850	72.68199	74.99623	109.99285
##	[8479]	101.48395	99.37129	95.22023	96.40774	100.44118	124.91094
##	[8485]	83.89670	97.96658	111.41103	94.27481	95.29873	89.92096
##	[8491]	85.64503	122.45598	90.28163	114.63759	100.96288	95.81288
##	[8497]	80.97660	109.95977	115.22664	98.10668	96.84141	128.23050
##	[8503]	99.90635	87.00719	115.13498	87.04308	102.08506	108.34924
##	[8509]	81.32295	86.84998	98.18188	106.01338	122.90419	141.66247
##	[8515]	81.43582	93.23975	65.05759	71.45332	107.15206	105.45282
##	[8521]	96.85353	114.96660	76.31183	123.37027	102.60841	132.28583
##	[8527]	107.83671	129.14954	83.86956	77.34721	84.20757	91.17469
##	[8533]	84.63701	102.54133	99.33109	91.59518	132.30736	64.50313
##	[8539]	98.61726	83.51180	96.31927	103.26511	113.32089	107.05564
##	[8545]	90.73088	97.53545	108.94643	101.62212	82.42669	93.07081
##	[8551]	88.23788	95.45818	86.10839	106.05786	110.67883	115.36888
##	[8557]	96.17602	89.99881	94.09024	137.52842	107.29786	119.56157
##	[8563]	104.63781	97.00596	88.88313	128.46405	95.85814	95.99468
##	[8569]	112.70948	90.97719	97.08705	92.99556	97.66686	80.89457
##	[8575]	92.68982	93.56934	103.22714	80.71076	142.02909	77.84656
##	[8581]	100.81242	106.76799	118.41985	94.37526	112.24174	115.45520
##	[8587]	103.51929	82.90718	122.04402	119.11144	103.43182	90.68007
##	[8593]	101.48430	122.42187	85.49946	79.24642	85.06780	84.32367
##	[8599]	101.07462	84.35334	132.92885	96.37849	87.43902	129.75128

##	[8605]	107.54835	92.67587	117.62445	142.42093	90.02786	82.55114
##	[8611]	85.86629	108.37868	99.09961	107.46675	99.63123	108.40677
##	[8617]	115.27292	111.36567	93.64495	85.80573	115.29209	119.31642
##	[8623]	93.18507	82.67647	77.54082	102.57077	107.92942	98.51738
##	[8629]	86.70643	78.15697	89.52651	113.57011	84.35783	125.42285
##	[8635]	98.48766	88.49344	91.52103	85.65435	101.29227	124.76578
##	[8641]	87.98685	115.48736	86.17775	112.01392	105.43263	96.94368
##	[8647]	94.73529	110.84509	111.84540	125.64969	68.62289	98.81448
##	[8653]	117.76181	102.36509	81.08640	91.29664	100.56666	116.99789
##	[8659]	88.63291	89.41388	114.96939	88.79067	106.15938	87.62873
##	[8665]	114.81814	87.69253	76.88049	110.22979	89.34567	102.00501
##	[8671]	76.75454	84.35510	97.43862	125.33486	107.09630	104.19968
##	[8677]	103.56362	84.49779	90.47949	99.82208	111.70767	81.23976
##	[8683]	122.16196	111.60367	83.07406	92.15622	130.04928	123.91420
##	[8689]	103.44006	117.90499	96.90005	110.65038	105.89171	115.07931
##	[8695]	96.70423	89.17798	105.37802	100.04744	73.03924	70.11611
##	[8701]	77.49668	85.58296	93.12495	99.51579	104.79314	83.98292
##	[8707]	117.51451	95.38527	114.92523	97.76322	97.64944	102.11728
##	[8713]	113.89630	114.64223	99.44888	129.25217	103.09197	100.53558
##	[8719]	82.93581	67.64488	93.38565	108.45950	113.14794	98.37990
##	[8725]	108.27181	106.32604	121.10649	121.18353	104.12119	116.52668
##	[8731]	103.17652	119.23999	83.22504	80.23728	87.62770	94.58934
##	[8737]	71.34150	95.82723	94.13070	111.30591	120.25740	109.33121
##	[8743]	84.02989	116.52074	104.61725	106.11044	130.67339	90.37550
##	[8749]	88.81783	85.01011	90.86613	118.39764	110.47333	104.10055
##	[8755]	63.00975	105.22951	95.39676	73.70630	90.68775	96.61289
##	[8761]	125.71136	120.49981	100.55427	122.88047	102.93621	114.48318
##	[8767]	117.88559	110.92989	91.88034	107.88945	99.30857	112.21801
##	[8773]	81.72085	124.33691	100.56882	104.16914	109.74165	101.74931
##	[8779]	95.79657	121.22839	107.08495	84.39086	112.01929	84.97207
##	[8785]	117.06737	112.76692	96.20418	104.22892	106.47999	79.35140
##	[8791]	86.40766	98.24311	103.90664	77.20945	107.83800	97.22224
##	[8797]	114.00043	101.73424	101.61454	88.91702	101.78877	120.89555
##	[8803]	95.73968	114.72998	80.14994	117.25869	110.83703	90.06182
##	[8809]	131.40892	73.86496	88.85412	84.98394	102.04565	87.19757
##	[8815]	93.50927	83.48158	83.19182	77.56519	109.05460	108.20065
##	[8821]	122.24646	119.94521	137.94040	98.71505	99.74910	103.12756
##	[8827]	101.06172	111.80287	111.80438	99.36392	87.42902	95.85911
##	[8833]	99.95101	84.33272	103.12018	114.81354	112.58651	104.80664
##	[8839]	127.80136	117.88509	95.09823	99.71194	109.91140	118.35446
##	[8845]	83.88678	99.17615	108.15646	100.19355	97.55469	102.70041
##	[8851]	97.54798	83.81335	114.16064	84.88647	75.94503	135.49497
##	[8857]	89.23623	110.43287	89.40468	100.74494	121.21293	85.05111
##	[8863]	87.89391	105.92015	102.30118	119.16345	68.79618	92.49718
##	[8869]	103.44031	95.70616	114.41451	108.01804	133.40570	80.21251
##	[8875]	99.73239	85.60486	96.57975	130.25619	90.10794	93.89951
##	[8881]	98.19507	68.72965	104.27437	71.34338	100.83819	71.09078
##	[8887]	122.59386	107.36203	101.06241	119.40818	116.81083	111.90656
##	[8893]	92.65372	90.06938	98.65197	113.78924	110.90289	112.00926
##	[8899]	85.49972	113.37554	114.31480	82.47329	102.80175	92.18687
##	[8905]	110.90016	84.47129	112.65409	98.28629	106.27036	111.30659
##	[8911]	106.33281	87.41167	104.98928	114.81838	104.51783	94.49600
##	[8917]	75.01512	96.37925	112.50014	100.24503	84.35854	89.46095
##	[8923]	94.02322	78.76183	128.44474	126.97582	96.32221	89.83511

##	[8929]	93.48579	86.50118	101.10120	93.13000	125.86227	78.22823
##	[8935]	96.92159	95.93362	117.04204	120.24054	109.88658	63.65256
##	[8941]	77.32773	88.38436	92.20132	100.24488	122.97960	108.54017
##	[8947]	92.95283	103.78581	89.68719	95.63047	117.32476	103.54425
##	[8953]	106.42170	94.04273	115.35998	91.49772	118.19762	103.02657
##	[8959]	97.75558	102.88407	93.54966	83.91606	96.25882	84.16386
##	[8965]	84.71202	84.72788	63.24972	107.89886	102.67872	122.53342
##	[8971]	81.31591	92.85041	129.66724	82.78612	99.69267	121.49944
##	[8977]	117.88134	119.72608	84.16433	101.43674	97.89475	110.76401
##	[8983]	105.62972	111.79057	89.26946	85.77711	64.66500	86.14034
##	[8989]	113.83875	114.88471	89.95843	132.88032	91.80781	105.06012
##	[8995]	92.23324	106.89104	99.40303	103.38239	91.06190	106.21318
##	[9001]	86.54553	110.23839	118.84115	90.45912	105.47058	103.48385
##	[9007]	111.47691	81.58041	99.23106	107.15350	74.05500	62.15396
##	[9013]	85.15265	100.08781	113.96473	93.34100	94.95250	105.59401
##	[9019]	118.48974	113.42904	89.43095	80.86719	112.25192	114.33016
##	[9025]	76.02839	114.64415	106.75280	119.00448	89.27812	110.54518
##	[9031]	132.61165	110.14835	86.29037	98.41459	83.69218	93.67580
##	[9037]	110.27865	102.07266	80.01876	96.60906	90.61691	102.42549
##	[9043]	92.73599	91.85791	112.61605	108.76517	88.84822	111.39109
##	[9049]	98.98745	67.39483	96.94763	88.41678	118.33815	104.09155
##	[9055]	116.05242	126.24156	105.07800	108.32870	115.09724	128.49355
##	[9061]	118.34006	110.99320	128.22261	101.26126	103.06361	85.51893
##	[9067]	98.27279	117.56889	104.77568	115.02411	110.20889	97.52209
##	[9073]	97.41553	101.41066	82.63300	100.05904	86.90043	90.47503
##	[9079]	104.62437	96.45656	111.03025	94.05663	122.30388	91.55126
##	[9085]	95.19503	112.31070	99.36341	117.97807	84.04432	114.85714
##	[9091]	101.70260	91.26122	90.29389	72.02996	87.11336	95.07901
##	[9097]	94.12748	123.37219	78.76940	113.10037	105.92288	85.95228
##	[9103]	96.62871	97.67218	102.94285	94.87825	90.83626	109.03065
##	[9109]	98.14126	105.46891	107.95997	66.52047	89.12444	97.78324
##	[9115]	109.75979	83.25557	53.27331	88.79991	93.27164	97.47661
##	[9121]	108.74109	107.43326	107.92925	111.68177	102.92783	103.02933
##	[9127]	117.99841	93.88396	105.33092	124.20683	99.67269	114.15723
##	[9133]	78.89133	106.62174	105.78177	79.77849	112.15870	86.27250
##	[9139]	87.21661	94.91491	72.65264	118.45115	98.19428	96.41095
##	[9145]	92.24048	78.79967	126.21858	113.07912	86.79202	82.38685
##	[9151]	131.94112	141.66955	114.85374	84.09879	108.26550	99.74641
##	[9157]	86.19237	64.52033	92.62665	100.60117	104.77293	117.66102
##	[9163]	101.06089	67.42629	105.95973	80.55645	102.15310	82.90692
##	[9169]	94.90498	85.13477	112.31967	101.06500	87.23222	83.94488
##	[9175]	101.96280	94.85634	88.50342	106.40320	90.61018	91.12230
##	[9181]	82.62878	107.94806	98.40994	97.13530	79.46609	110.21033
##	[9187]	88.07077	87.30328	87.32220	91.89572	95.05558	118.75268
##	[9193]	68.41530	104.12479	91.20579	119.15562	92.35100	100.28887
##	[9199]	90.39724	102.84579	94.98021	85.88335	101.07282	86.78038
##	[9205]	92.45189	94.75802	129.71873	106.60374	94.36830	91.85125
##	[9211]	92.18922	92.04229	99.27825	99.14567	120.97917	80.82075
##	[9217]	103.22994	96.98922	99.13080	116.38729	93.86410	88.58714
##	[9223]	74.11593	84.73782	88.39126	109.79838	95.82826	133.34777
##	[9229]	80.03050	99.94072	105.02610	134.04486	107.51873	114.74795
##	[9235]	94.70246	92.61943	115.03046	113.63430	106.24674	87.62921
##	[9241]	77.94909	94.91458	103.39447	93.29469	75.42831	116.86779
##	[9247]	86.93750	127.29092	106.04642	92.48039	96.26865	93.67867

##	[9253]	67.38677	75.44437	94.20750	90.14057	110.86594	101.91840
##	[9259]	100.52560	95.14404	98.19967	82.46303	84.47597	76.79929
##	[9265]	98.84185	74.95429	92.54301	90.37518	96.25944	92.05921
##	[9271]	112.12730	124.74461	83.85389	140.72027	82.58784	111.13098
##	[9277]	103.42998	87.12563	120.99836	94.71201	97.08419	75.38513
##	[9283]	88.02868	110.49891	101.36054	125.11612	100.13342	117.47985
##	[9289]	81.07414	101.42660	96.86609	102.62403	87.86465	74.83979
##	[9295]	99.35465	128.30302	113.63714	98.51903	91.46100	95.00269
##	[9301]	94.56369	103.27564	85.62555	113.15199	93.18942	119.12179
##	[9307]	93.32757	111.75945	94.30151	122.16208	111.74462	99.77658
##	[9313]	86.21889	89.80743	100.96649	93.61898	70.85058	114.11112
##	[9319]	93.99759	123.54433	114.19076	96.32793	104.42555	108.33405
##	[9325]	102.09364	99.06962	103.81453	110.74650	93.92857	92.89196
##	[9331]	82.59344	82.56316	93.26511	119.78114	81.89301	95.06281
##	[9337]	109.63560	86.56962	109.48637	115.26859	103.10261	85.64801
##	[9343]	98.30165	100.50681	88.44156	95.89925	103.83501	98.64476
##	[9349]	95.86047	115.90076	106.95432	95.22440	104.17396	103.58726
##	[9355]	123.59318	106.12040	72.49325	115.53933	105.09714	104.93965
##	[9361]	122.92554	106.32381	117.85732	91.54341	101.16997	91.14367
##	[9367]	107.37015	112.42869	72.16749	107.35701	87.07649	107.56111
##	[9373]	109.95934	92.87324	91.04201	97.60438	94.93939	106.27281
##	[9379]	84.76301	101.36495	92.73601	138.69176	145.67057	90.12388
##	[9385]	105.43473	87.34476	93.06490	103.28201	98.34969	93.72907
##	[9391]	77.36837	78.22906	116.00559	80.33216	96.70641	114.43368
##	[9397]	66.09301	102.24248	91.13182	71.25458	104.99524	112.10502
##	[9403]	105.27163	116.79476	87.15606	89.52993	88.04362	103.87210
##	[9409]	94.09862	103.24260	85.14348	103.88746	102.99752	93.46628
##	[9415]	85.06255	109.93426	93.68479	109.43263	110.49144	122.54121
##	[9421]	77.22585	137.75296	124.44721	97.77220	74.85596	90.79143
##	[9427]	111.40656	117.74342	86.98362	114.35105	95.02317	90.69256
##	[9433]	117.86731	78.79149	115.32305	100.48971	126.97054	90.19533
##	[9439]	62.40100	115.28613	88.89539	106.34758	103.82674	93.40859
##	[9445]	88.78358	98.52632	128.51498	89.73552	71.24787	112.64535
##	[9451]	71.89364	92.17828	105.29181	93.43195	90.39079	69.60635
##	[9457]	90.06134	127.99147	102.26811	126.01149	101.26125	91.91322
##	[9463]	102.55760	98.77162	80.47832	110.76233	70.01657	128.58534
##	[9469]	110.97234	84.01888	93.84327	85.03331	94.28050	123.10465
##	[9475]	100.52466	57.90595	111.65393	88.56105	122.02458	128.51135
##	[9481]	81.83011	93.16141	125.63205	117.06460	107.65145	101.16190
##	[9487]	102.03615	116.89521	86.99164	102.04578	110.96689	108.06513
##	[9493]	103.64955	111.37657	107.11955	94.51984	90.07259	84.48104
##	[9499]	114.94094	96.56773	102.24725	114.30107	126.42107	101.78572
##	[9505]	90.72151	120.34276	105.42394	121.95232	100.43579	100.52635
##	[9511]	57.34031	107.93336	103.35093	65.35015	111.28388	132.94163
##	[9517]	99.61262	90.19994	94.64789	110.08231	105.48389	100.86070
##	[9523]	81.19708	101.70614	103.64787	99.68700	129.14131	120.41027
##	[9529]	90.69557	97.25760	137.18649	98.20740	68.56138	86.66783
##	[9535]	111.67538	76.31881	116.40824	59.64305	68.75963	127.56088
##	[9541]	105.77532	81.86802	81.55353	90.73238	94.08031	122.03722
##	[9547]	62.16531	119.06351	81.58878	112.26156	94.57195	98.62453
##	[9553]	112.94685	109.70245	109.37356	115.91387	78.82971	91.55080
##	[9559]	75.79871	93.98219	94.60954	85.57530	102.24123	89.05924
##	[9565]	136.19866	113.98846	108.13185	109.88084	79.58127	105.30411
##	[9571]	115.33796	125.28356	108.25318	95.57654	74.74975	93.61687

##	[9577]	89.80397	74.82801	117.26881	96.15961	123.00135	124.48569
##	[9583]	100.10539	111.05678	128.04907	118.84366	79.72916	108.14752
##	[9589]	100.38475	129.71000	101.65595	117.83743	125.66161	105.95400
##	[9595]	103.69019	93.55391	112.67208	94.31138	104.70339	98.18020
##	[9601]	77.28798	118.46683	114.16243	96.38746	112.66393	101.21903
##	[9607]	96.48146	111.24621	114.05711	106.02184	112.81966	79.86822
##	[9613]	95.72404	97.88523	87.22075	112.90043	99.48753	105.94661
##	[9619]	108.24783	101.89206	104.43493	130.39278	102.30994	102.21522
##	[9625]	91.97634	102.17297	114.69277	112.10111	120.09511	90.73006
##	[9631]	117.30296	95.98633	104.57401	68.32018	83.02772	111.34788
##	[9637]	107.82147	78.43191	105.00661	100.24114	85.43036	97.45450
##	[9643]	108.63591	117.33323	74.61889	118.56671	83.31843	113.36656
##	[9649]	108.54432	107.67661	74.64125	112.35734	110.17137	89.06441
##	[9655]	100.70038	110.10928	114.19642	116.14232	108.03457	100.81940
##	[9661]	111.40663	111.76214	81.65845	105.48654	102.97162	93.57476
##	[9667]	81.87523	100.43952	86.98485	119.64344	91.79945	103.13710
##	[9673]	81.59535	122.03644	87.87440	85.29303	91.13337	84.99375
##	[9679]	128.41117	113.65557	84.02134	107.96588	107.10014	67.55105
##	[9685]	99.34686	118.23117	92.12378	105.83788	129.86097	77.52735
##	[9691]	102.65349	101.74255	98.82267	109.39767	102.46348	97.79864
##	[9697]	101.34891	142.68246	90.26517	102.04449	103.88561	104.15097
##	[9703]	101.93489	105.53045	110.00865	105.06238	86.47678	84.95486
##	[9709]	95.60792	83.68958	106.41946	115.85224	110.89915	109.83616
##	[9715]	86.72720	86.55221	92.95312	96.83739	107.33222	74.14507
##	[9721]	76.45025	95.55194	97.62917	79.17095	87.22210	136.33188
##	[9727]	92.93582	110.77741	97.50731	99.08267	83.77410	101.28869
##	[9733]	112.66974	98.35861	115.21419	94.01848	95.56824	91.39673
##	[9739]	112.79451	90.27998	127.10516	115.35827	111.77001	93.34098
##	[9745]	113.59182	95.05213	116.46820	92.37652	103.34766	100.19163
##	[9751]	85.10866	101.25433	98.09855	111.26836	118.95111	96.89508
##	[9757]	98.64696	90.33361	95.16766	93.29961	104.71760	108.36495
##	[9763]	79.67501	124.54426	94.97601	113.65985	92.27952	95.88687
##	[9769]	109.48855	111.58104	93.68029	115.59560	100.37188	100.73490
##	[9775]	92.08393	110.89556	113.31805	83.26079	105.30030	108.46534
##	[9781]	103.75981	121.33134	106.60097	102.71200	90.50297	110.04923
##	[9787]	81.81623	95.71088	104.00311	85.61567	118.12156	114.43493
##	[9793]	98.34933	98.64671	106.97863	91.95271	101.66937	104.49264
##	[9799]	120.93483	71.64376	110.97068	122.40614	99.73102	68.11161
##	[9805]	80.08925	93.92325	95.88692	100.04543	100.34281	92.03155
##	[9811]	90.59603	90.09326	81.04762	95.90577	98.10475	105.61427
##	[9817]	99.32699	90.58584	85.72899	101.17477	100.89623	117.14234
##	[9823]	102.55108	119.38181	102.03665	101.23978	133.14731	126.46430
##	[9829]	71.96152	95.99441	85.98130	114.40564	111.44239	76.32090
##	[9835]	131.29355	88.91088	120.77894	102.08752	115.18549	107.18168
##	[9841]	92.38538	100.63074	100.46005	83.59253	92.60299	95.31401
##	[9847]	126.49789	94.82677	64.10451	85.26928	107.26317	108.69797
##	[9853]	89.68228	79.03787	76.78079	97.37845	91.34719	132.30365
##	[9859]	78.82355	121.94112	111.90000	102.87926	102.88443	83.96948
##	[9865]	128.01647	103.23734	92.78011	81.90210	118.87650	125.31632
##	[9871]	106.21759	93.61908	107.13835	98.84534	81.01848	95.36123
##	[9877]	62.98153	99.73287	106.25967	112.21955	120.89291	98.65850
##	[9883]	97.98063	96.56991	94.91088	114.41092	120.55528	110.74822
##	[9889]	91.08374	103.27757	96.10790	77.30077	100.86849	102.93511
##	[9895]	79.74095	75.13456	110.72490	91.86671	86.95196	82.57324

```
## [9901] 110.33854 116.12515 93.16497 98.92726 88.90577 98.09392
## [9907] 95.98267 106.52177 99.89703 101.26549 126.94355 96.57464
## [9913] 80.30590 76.37415 98.23455 105.18941 102.88608 101.21262
## [9919] 101.31382 82.60430 102.77852 105.08792 95.02736 130.54997
## [9925] 104.76690 88.16086 85.15733 82.05257 97.32088 96.50198
## [9931] 98.24279 99.76396 93.81472 110.69215 95.64774 101.82550
## [9937] 85.99071 120.32371 102.16257 111.91640 96.12231 109.90181
## [9943] 109.06357 112.91681 116.82178 104.84340 105.18354 119.33201
## [9949] 87.74008 94.40796 117.31689 98.15829 80.58475 120.79321
## [9955] 91.58550 92.98582 100.95756 100.12900 88.01846 103.01935
## [9961] 72.83545 116.92945 83.30466 99.16747 88.65060 121.12635
## [9967] 104.10751 72.61319 107.19541 76.73995 108.63035 85.48945
## [9973] 73.85899 110.28932 126.12776 94.56055 97.24468 132.55836
## [9979] 123.70919 95.01478 121.38738 115.83431 104.10225 100.37677
## [9985] 101.76337 97.88857 126.07045 86.72897 117.59249 75.43603
## [9991] 117.22669 97.53619 93.75588 116.18414 89.48363 69.38659
## [9997] 118.72824 101.23768 95.47112 124.09379
```

## C

Create a new figure with 3 panels: PDF, CDF, and histogram of random values with 20 bins.

```
pdf <- data.frame(
  x = seq,
  pdf = dnorm(seq, mu, sigma)
)

cdf <- data.frame(
  x = seq,
  cdf = pnorm(seq, mu, sigma)
)

histogram <- data.frame(
  x = x
)

pdf_plot <- ggplot(pdf, aes(x = x, y = pdf)) +
  geom_line(aes(y = pdf)) +
  labs(
    title = "PDF",
    subtitle = "mean = 100, sd = 15",
    x = "Values",
    y = "PDF"
  ) +
  theme_minimal()

cdf_plot <- ggplot(cdf, aes(x = x, y = cdf)) +
  geom_line(aes(y = cdf)) +
  labs(
    title = "CDF",
    subtitle = "mean = 100, sd = 15",
    x = "Values",
    y = "CDF"
  ) +
```

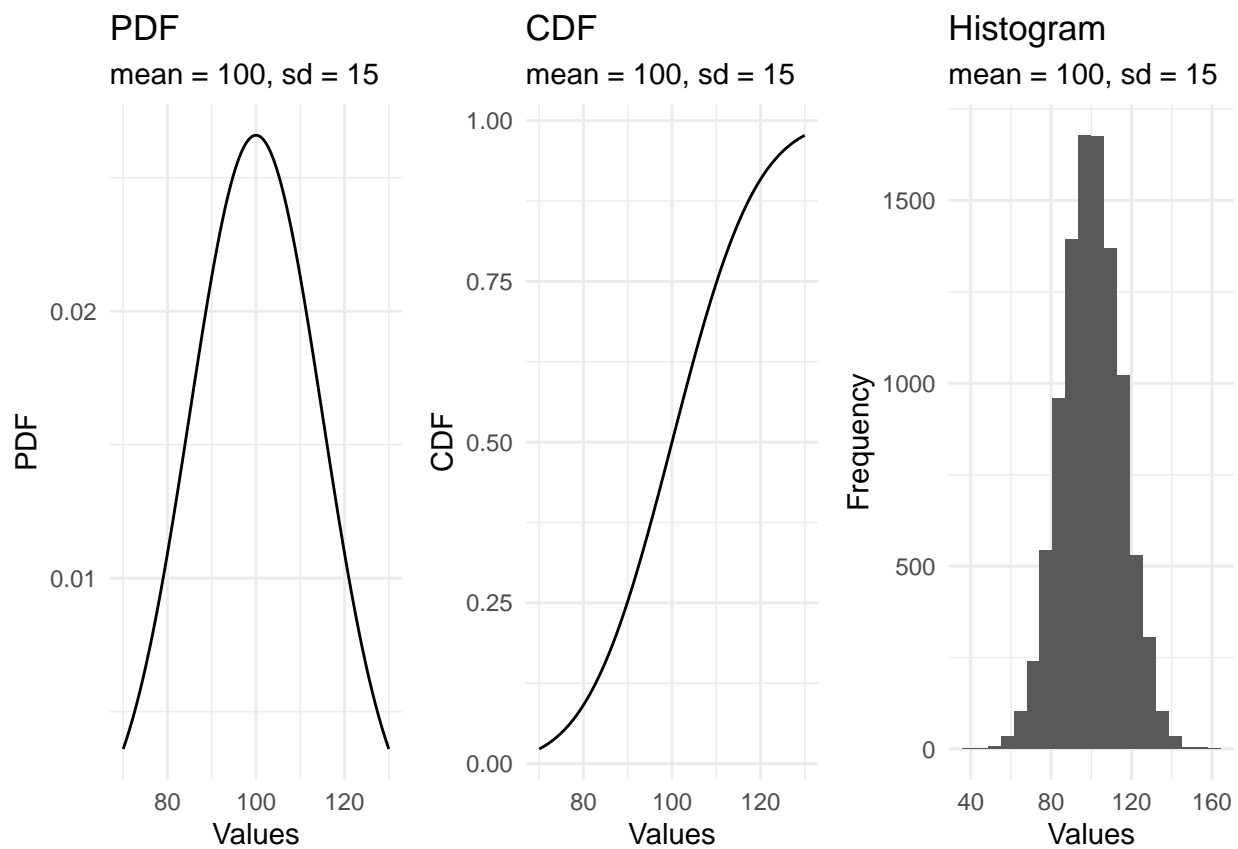
```

theme_minimal()

histogram_plot <- ggplot(histogram, aes(x = x)) +
  geom_histogram(bins = 20) +
  labs(
    title = "Histogram",
    subtitle = "mean = 100, sd = 15",
    x = "Values",
    y = "Frequency"
  ) +
  theme_minimal()

plot_grid(pdf_plot, cdf_plot, histogram_plot, nrow = 1)

```



## Exercise 4

The number of visits per day to a website follows a Poisson distribution with a mean of 120 visits per day. The duration of each visit follows an exponential distribution with a mean time of 5 minutes. The percentage of visitors who purchase something is 20%, and the bills follow a normal distribution with a mean of 50€ and a standard deviation of 10€.

**A**

Calculate the probability that at least 120 visits are made in a day.

```
lambda <- 120
ppois(119, lambda, lower.tail = FALSE)
```

```
## [1] 0.51214
```

## B

Calculate the expected value and variance of the average duration of a visit.

```
lambda <- 1 / 5
mean <- 1 / lambda
var <- 1 / lambda^2
mean
```

```
## [1] 5
```

```
var
```

```
## [1] 25
```

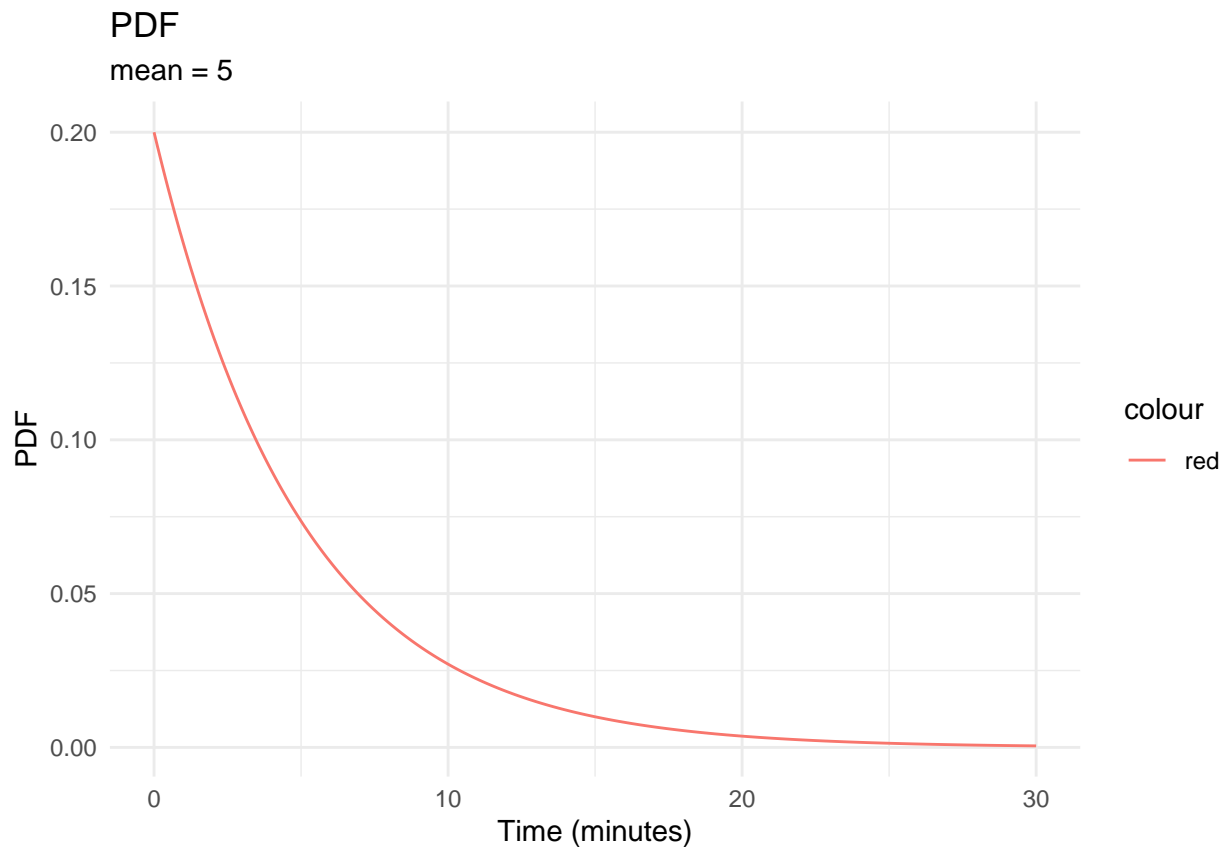
## C

Draw the PDF for the random variable “duration of a visit”.

```
seq <- seq(0, 30, 0.01)
exponential <- data.frame(
  x = seq,
  pdf = dexp(seq, lambda)
)

ggplot(exponential, aes(x = x, y = pdf)) +
  geom_line(aes(y = pdf, color = "red")) +
  labs(
    title = "PDF",
    subtitle = "mean = 5",
    x = "Time (minutes)",
    y = "PDF"
  ) +
  theme_minimal()
```





## D

Calculate the probability that a visit lasts from 5 to 10 minutes.

```
pexp(10, lambda) - pexp(5, lambda)
```

```
## [1] 0.2325442
```

## E

Given that exactly 100 visits were made in a day, what is the probability to observe at least 20 purchases?

```
lambda <- 0.2 * 100  
ppois(19, lambda, lower.tail = FALSE)
```

```
## [1] 0.5297427
```

## F

Compute the probabilities to observe a purchase between 40 and 60, 30 and 70, 20 and 80.

```
mu <- 50  
sigma <- 10  
pnorm(60, mu, sigma) - pnorm(40, mu, sigma)
```

```
## [1] 0.6826895
```

```
pnorm(70, mu, sigma) - pnorm(30, mu, sigma)
```

```
## [1] 0.9544997
```

```
pnorm(80, mu, sigma) - pnorm(20, mu, sigma)
```

```
## [1] 0.9973002
```

## G

Simulate 1000 average days, compute the average daily revenue and compare it to the expected revenue.

```
n <- 1000
lambda_visits <- 120
lambda_duration <- 1 / 5
purchases <- 0.2
mu_bills <- 50
sigma_bills <- 10

visits <- rpois(n, lambda_visits)
durations <- rexp(n, lambda_duration)
purchases <- rbinom(n, visits, purchases)
bills <- rnorm(n, mu_bills, sigma_bills)
revenue <- purchases * bills

daily_revenue <- mean(revenue)
expected_revenue <- lambda_visits * purchases * mu_bills

daily_revenue
```

```
## [1] 1210.999
```

```
mean(expected_revenue)
```

```
## [1] 144930
```