

# PBSR Assignment 1

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All the questions of the assignment are done here, and in no separate notebook.

## Q1 (i)

X is a continuous random variable whose p.d.f is given by

$$f(x) = ax^{a-1} \quad \text{for } 0 \leq x \leq c$$

The distribution function of X is given by

$$F(x) = P(X \leq x) = \int_0^x f(t)dt = \left(\frac{x}{c}\right)^a \quad \text{for } 0 \leq x \leq c$$

## Q1 (ii)

In order to find the inverted CDF, we equate the CDF to some probability, p and solve for x.

$$\begin{aligned} \left(\frac{x}{c}\right)^a &= p \quad \text{for } 0 \leq x \leq c \\ x &= c.p^{\frac{1}{a}} \end{aligned}$$

which is the required inverted CDF

## Q1 (iii)

```
# Code for Question 1 part 3
func1<-function(a,c) {
  set.seed(1)
  u<-runif(1)
  icdf<-c*u^(1/a)
  return(icdf)
}
```

```
# Code for Question 1 part 3
func1<-function(a,c) {
  set.seed(1)
  u<-runif(1)
  icdf<-c*u^(1/a)
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```

```
# Code for Question 1 part 3
func1<-function(a,c) {
  set.seed(1)
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}
```

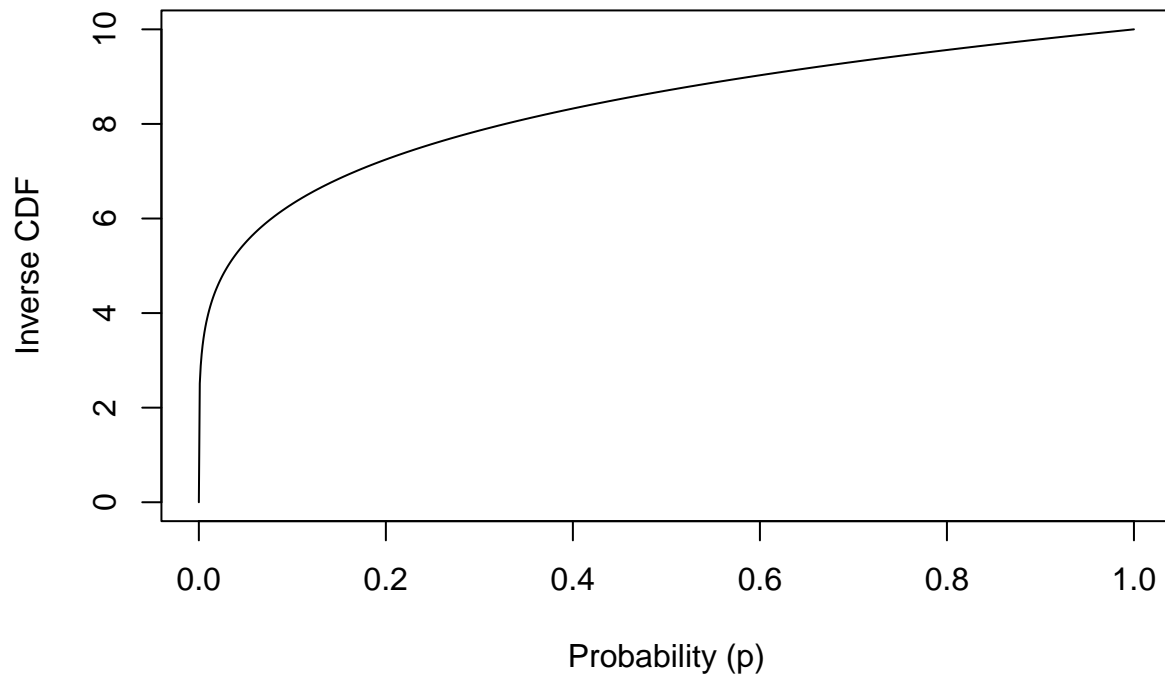
## Q1 (iv)

```
# Code for Question 1 part 4
a <- 5
c <- 10
```

```
inv_cdf <- function(p) {
  c * p^(1/a)
}
```

```
curve(inv_cdf, from = 0, to = 1, n = 1000, xlab = "Probability (p)", ylab = "Inverse CDF", main = "Inverse CDF")
```

## Inverse CDF Plot



```
p_val <- seq(0, 1, by = 0.01)
x_val <- inv_cdf(p_val)
min_x <- x_val[which.min(p_val)]

cat("Range of x values with the least probability:", min_x, "\n")
```

```
## Range of x values with the least probability: 0
```

## Q1 (v)

```
# Code for Question 1 part 5
inv_cdf<-function(a,c) {
  sample_size=1000
  set.seed(1)
  u<-runif(sample_size)
  icdf<-c*u^(1/a)
  return(icdf)
}
a=5
c=10
inv_cdf(a,c)
```

```
##      [1] 7.670360 8.206113 8.945584 9.809278 7.259946 9.787977 9.886817 9.204786
```

## [9] 9.114773 5.730314 7.290591 7.069307 9.276715 8.258282 9.490307 8.697479  
 ## [17] 9.357907 9.983760 8.240712 9.508981 9.865860 7.333741 9.179226 6.603389  
 ## [25] 7.680226 8.266908 4.220445 8.250891 9.724628 8.060925 8.642191 9.027497  
 ## [33] 8.682898 7.145031 9.628094 9.226053 9.549713 6.406774 9.373743 8.371945  
 ## [41] 9.613089 9.166192 9.522367 8.882817 8.806619 9.537940 4.716148 8.624731  
 ## [49] 9.395923 9.292081 8.626139 9.705586 8.478403 7.546774 5.886513 6.302822  
 ## [57] 7.943503 8.769448 9.208147 8.353772 9.819341 7.826223 8.558053 8.022890  
 ## [65] 9.176962 7.626576 8.629480 9.481586 6.096924 9.737187 8.054872 9.656016  
 ## [73] 8.090710 8.029541 8.621552 9.774449 9.712631 8.283437 9.508676 9.919965  
 ## [81] 8.465056 9.344558 8.325509 7.988601 9.458650 7.267205 9.340900 6.562244  
 ## [89] 7.551031 6.780347 7.514637 5.676410 9.152632 9.739295 9.512572 9.557082  
 ## [97] 8.543870 8.367093 9.589374 9.043603 9.187802 8.120887 7.697619 9.985325  
 ## [105] 9.127428 7.341093 6.643062 8.627938 9.843315 9.025072 9.951881 9.394585  
 ## [113] 8.137054 8.452611 6.826159 4.200543 9.352548 6.349254 8.509858 9.146390  
 ## [121] 9.983624 8.690107 8.650312 7.044189 9.452981 8.538689 8.744058 7.301675  
 ## [129] 7.444531 9.015862 8.951880 5.989227 5.130325 9.154077 9.852970 9.023056  
 ## [137] 8.907938 8.794309 9.970011 8.731955 9.265251 9.033438 7.509860 7.627457  
 ## [145] 9.388201 8.533699 7.057819 9.432548 6.371294 9.713092 9.072456 8.896023  
 ## [153] 8.005351 8.535812 8.707041 7.103487 8.806323 5.961163 7.739852 7.337588  
 ## [161] 7.778665 9.780786 8.509671 9.515185 9.748945 8.379462 5.767342 8.037764  
 ## [169] 9.373782 8.047934 9.118537 9.658716 9.694114 8.289248 8.242701 9.781553  
 ## [177] 9.158403 9.418307 9.044710 9.798180 7.826899 7.183314 9.761823 8.717103  
 ## [185] 9.741047 7.167724 9.461187 9.375783 9.884827 8.865436 9.342535 8.278825  
 ## [193] 6.320553 9.850182 7.770136 9.000253 6.435211 9.658469 7.951984 9.522168  
 ## [201] 7.681878 7.378159 8.763225 7.690145 7.105857 8.769251 8.913909 6.640847  
 ## [209] 7.616801 9.358733 9.921600 6.311350 9.473932 9.893697 9.607669 7.903010  
 ## [217] 9.173318 9.904920 9.905704 8.059173 7.652746 6.978072 7.972903 8.740481  
 ## [225] 9.843089 8.743339 7.624236 5.412744 8.398571 9.689285 8.093262 6.664185  
 ## [233] 8.216509 9.121446 8.283817 9.283740 9.283162 8.888798 8.445353 8.534262  
 ## [241] 7.893507 8.962698 9.813945 6.773707 8.387250 7.325309 8.441914 6.676789  
 ## [249] 8.561893 9.883218 9.470829 9.862067 8.600919 9.039577 8.652597 6.416982  
 ## [257] 7.564751 8.700327 8.209387 9.865830 8.787472 7.947883 7.741023 9.533548  
 ## [265] 9.318041 6.974472 5.779027 9.452692 9.089411 7.012506 5.738227 6.419610  
 ## [273] 8.247991 7.010306 7.852957 7.190432 7.621563 7.106355 8.625033 9.492514  
 ## [281] 4.883922 8.798595 9.748281 8.210253 5.447212 6.735508 7.969555 6.886078  
 ## [289] 6.672135 7.396029 7.429642 6.663923 9.962852 7.996744 8.729537 9.261596  
 ## [297] 6.299053 6.531881 5.502429 9.854325 9.240488 6.243307 8.679570 8.567302  
 ## [305] 8.219708 9.982135 7.067657 9.595433 5.848849 8.327403 6.759782 7.198646  
 ## [313] 9.660409 9.363886 7.680177 8.688030 6.080436 8.124044 9.937645 9.101988  
 ## [321] 9.215406 7.924414 8.349083 9.992142 9.691736 9.905321 9.592766 9.520540  
 ## [329] 7.684002 9.471271 9.972472 7.826234 8.322829 9.592356 5.990583 8.168605  
 ## [337] 8.495732 6.902742 8.974603 9.939599 9.978911 7.068469 8.847504 8.259142  
 ## [345] 9.247204 7.692106 8.595696 7.030799 8.193130 9.378128 8.656731 5.767233  
 ## [353] 9.526288 8.400441 9.961745 7.768223 9.675359 6.067584 9.761840 8.605491  
 ## [361] 6.420454 8.027149 9.651355 7.734796 8.989444 9.649778 5.894404 9.318880  
 ## [369] 9.308370 8.576233 8.473886 8.911988 9.852690 7.456268 7.399420 8.408035  
 ## [377] 8.028318 9.713682 7.074407 8.682115 8.445702 8.918595 9.191836 9.956735  
 ## [385] 7.467202 7.522037 9.555948 9.638077 6.471502 9.925523 6.817954 6.783396  
 ## [393] 9.845776 8.729868 6.886250 8.098251 9.202064 7.920772 8.113406 6.822786  
 ## [401] 9.199431 7.136203 9.907044 9.786798 9.884769 9.373690 8.198306 9.517703  
 ## [409] 4.068658 9.877660 9.987467 8.140148 9.434914 9.546511 9.327035 8.619647  
 ## [417] 8.686811 7.901780 9.298192 9.617410 8.465282 8.756214 9.210944 6.779042  
 ## [425] 8.080434 8.349387 6.112249 9.861352 9.653585 9.746318 9.867985 5.915895  
 ## [433] 8.235172 8.833537 6.372052 9.567557 9.414652 5.539228 8.642511 9.835726

## [441] 5.292600 7.828292 8.708465 9.057956 7.663068 8.419539 8.181442 9.882271  
 ## [449] 6.584010 5.875707 9.927593 8.495416 8.197931 7.018013 5.581932 9.196498  
 ## [457] 8.962102 9.974069 9.040189 5.787829 6.949627 8.618099 2.865754 8.491377  
 ## [465] 7.643719 9.873676 9.353246 6.957978 8.620961 9.285432 8.564863 9.908639  
 ## [473] 9.344625 8.313626 6.518843 7.517688 9.711037 8.470179 8.698069 9.289924  
 ## [481] 9.466698 6.891137 9.678951 9.891298 8.993679 8.713329 7.172161 2.836711  
 ## [489] 9.742202 6.691032 4.692051 9.875197 7.822730 6.968536 8.321793 8.559953  
 ## [497] 8.462606 8.763947 9.671622 5.601852 8.886479 9.280095 9.197140 9.211866  
 ## [505] 8.606597 9.938300 8.334658 9.679167 9.457545 8.816180 9.734579 8.587857  
 ## [513] 3.819457 9.384226 9.355222 7.154283 9.163377 8.847010 8.036965 9.140116  
 ## [521] 9.632344 9.335255 8.099405 6.632301 8.275303 9.852041 9.574000 9.462669  
 ## [529] 9.912999 9.987798 9.048107 4.938579 8.042349 7.739307 6.513039 5.334988  
 ## [537] 8.198097 8.044418 7.045896 9.093402 8.316536 9.909737 9.183941 8.005187  
 ## [545] 7.226998 6.492287 9.991918 8.237421 8.911389 9.396960 9.727119 8.943449  
 ## [553] 4.060345 9.805187 9.492309 8.251394 6.232581 5.485170 9.613595 9.632630  
 ## [561] 9.187827 6.678175 8.067834 9.393504 9.807298 9.301359 7.526827 9.157810  
 ## [569] 7.756468 9.913800 6.917494 8.400510 7.590729 6.237139 9.628895 8.791893  
 ## [577] 9.224067 8.359709 9.663251 9.408697 8.097889 9.895724 9.165112 5.122715  
 ## [585] 9.018090 8.388342 5.986623 8.801057 9.923505 9.334636 8.884228 7.535390  
 ## [593] 9.510441 9.179978 9.634769 9.170411 8.634129 8.688250 8.240007 8.525820  
 ## [601] 9.597359 9.853314 6.819417 9.440426 9.950834 9.949069 8.109026 8.300190  
 ## [609] 9.899919 6.391324 9.865976 8.088275 8.817700 8.836588 9.350330 8.349498  
 ## [617] 6.867805 8.060375 9.107636 5.646002 9.683983 7.337214 8.838777 6.714577  
 ## [625] 7.986208 9.091363 7.614510 9.131408 8.655031 9.873178 9.697214 8.200636  
 ## [633] 7.933078 9.630794 8.530947 7.941526 6.281673 5.786949 9.283281 9.224904  
 ## [641] 9.801357 7.868884 9.861853 7.262112 9.545234 7.418118 4.984110 9.707444  
 ## [649] 9.271537 9.881368 9.246355 9.664467 8.160492 8.293508 8.929391 6.247175  
 ## [657] 7.202174 8.992600 9.444659 9.719138 8.204666 9.560689 5.664416 9.098260  
 ## [665] 8.136663 8.992176 9.821295 7.243749 8.192660 9.234159 9.486119 8.781635  
 ## [673] 9.629726 8.797879 8.711608 8.407064 8.162313 6.580871 7.850374 7.733827  
 ## [681] 9.491253 9.510780 6.784910 8.758912 9.020484 8.725758 8.266847 8.431443  
 ## [689] 4.112250 9.833191 6.025700 8.731034 9.611274 9.023970 8.423733 8.902881  
 ## [697] 9.537308 6.997043 9.940192 8.611218 9.855362 9.793527 9.443095 9.248310  
 ## [705] 9.168891 5.928677 8.421368 8.810289 9.882689 9.343797 9.375761 8.598909  
 ## [713] 6.546969 9.522768 8.478637 8.452541 4.873712 6.810895 8.417534 9.483630  
 ## [721] 3.432724 9.039600 9.803589 9.329155 7.653114 9.682638 8.028726 8.962482  
 ## [729] 8.457696 5.527415 9.389472 8.867131 9.443950 5.509643 9.350979 7.847912  
 ## [737] 7.771478 9.633914 6.127709 5.321062 8.100290 8.848175 9.057100 7.703943  
 ## [745] 7.285319 8.247627 8.607778 9.646975 6.559865 9.246230 8.693932 9.796348  
 ## [753] 8.877117 6.634746 8.493494 7.191092 8.465995 7.421437 9.920953 8.518016  
 ## [761] 9.508246 6.915955 9.718173 7.291801 7.080427 6.973318 8.921770 9.382715  
 ## [769] 9.738516 9.333805 8.625574 9.611528 4.406416 9.992210 9.131463 8.440830  
 ## [777] 4.905034 9.449251 7.309321 9.998911 9.807206 9.344428 9.392377 8.607522  
 ## [785] 9.708517 6.977744 9.089464 7.819430 8.547123 5.393462 7.078134 5.656969  
 ## [793] 9.886262 8.072236 8.767134 9.103536 7.499748 8.760942 9.579115 8.098077  
 ## [801] 9.699895 5.098114 9.941309 9.428532 7.714605 9.249779 8.096601 9.891721  
 ## [809] 8.052737 5.014735 8.122673 8.271227 8.138058 9.918624 8.256710 8.861194  
 ## [817] 9.845975 9.827896 7.534003 9.356530 8.101243 8.886820 9.423116 9.610164  
 ## [825] 9.724553 5.139661 7.387443 8.183270 7.889656 9.384390 9.310777 9.813278  
 ## [833] 9.670151 9.511668 8.329040 8.957891 5.978229 9.731961 9.911001 8.724681  
 ## [841] 9.843937 6.695040 7.509032 8.670269 8.613243 8.466359 5.233179 9.158446  
 ## [849] 9.352551 8.113837 9.890752 9.423456 5.509963 9.960417 7.372598 5.149109  
 ## [857] 7.642395 9.365191 7.565772 7.484839 4.618414 7.665222 9.289585 5.104924  
 ## [865] 5.748741 8.315961 8.670502 9.120373 9.372948 5.984578 8.412952 9.946892

```
## [873] 9.596307 7.412411 8.669489 4.082480 7.630034 8.541333 9.418048 9.981250
## [881] 8.021973 9.887060 9.922515 9.789911 8.679992 9.527233 9.570971 9.251585
## [889] 8.971741 8.014537 2.653154 5.802936 6.121405 4.202606 8.039001 6.535850
## [897] 9.009447 5.180495 3.946378 6.945223 9.638604 9.482902 7.711922 7.159900
## [905] 7.425575 5.733724 5.694895 6.825646 5.924479 5.326757 8.782352 9.537639
## [913] 9.297499 5.816525 4.475591 8.494065 6.910546 9.361143 9.321963 9.759125
## [921] 7.988154 9.941073 9.969454 5.231465 9.777455 9.616489 9.375125 7.801095
## [929] 8.712281 8.440325 9.058749 9.847655 7.517732 7.706835 9.402815 9.444764
## [937] 9.857161 8.571673 9.704417 7.922113 7.305147 9.836388 5.551660 8.371460
## [945] 8.547871 8.390532 9.231255 9.458193 9.816705 9.610759 6.227323 7.080080
## [953] 9.152422 9.734876 9.005551 7.652501 9.755872 7.156290 8.666388 3.966675
## [961] 8.153896 8.494078 6.605219 9.100969 7.872730 7.514686 8.145716 9.776009
## [969] 9.981184 9.396198 9.985534 8.839849 8.461712 9.928327 6.827155 5.815074
## [977] 4.752780 9.065888 9.302459 9.566254 6.726759 6.929583 9.977567 8.319887
## [985] 7.157986 8.626531 8.854359 8.002333 9.999861 8.800166 6.687268 8.480117
## [993] 9.090536 7.268783 6.691615 9.507485 9.134496 7.764112 7.183310 7.670522
```

## Q1 (vi)

```
# Code for Question 1 part 6
a=5
c=10
sample_size=1000
sample_data=c*runif(sample_size)^(1/a)
sample_mean= mean(sample_data)

#Theoretical Mean- calculated by hand: ac/(a+1)

tmean=a*c/(a+1)

cat("Sample Mean:", sample_mean, "\n")
```

```
## Sample Mean: 8.26102
```

```
cat("Theoretical Mean:", tmean, "\n")
```

```
## Theoretical Mean: 8.333333
```

```
approx_lim=0.1
if(abs(sample_mean-tmean)<approx_lim){
  cat("The sample mean is approximately equal to the theoretical mean within the specified approximation")
} else{
  cat("The sample mean is not approximately equal to the theoretical mean within the specified approximation")
}
```

```
## The sample mean is approximately equal to the theoretical mean within the specified approximation.
```

The CONCLUSION we can draw is that the mean value of the original distribution and of the samples drawn by the Inverse transform method is almost the same. Basically what we did here is that, we verified the method to be very efficient to draw random samples following some random distribution.

## Q2 (i)

```
# Code for Question 2 part 1
mean <- 160
variance <- 160^2
sample_size <- 10000
lambda=mean

set.seed(123)

uniform_heights <- runif(sample_size, min = mean - sqrt(variance), max = mean + sqrt(variance))
poisson_heights <- rpois(sample_size, lambda)
normal_heights <- rnorm(sample_size, mean, sqrt(variance))

uniform_heights
```

```
##      [1]  92.02480644 252.25764334 130.87261498 282.56556928 300.94953097
##      [6]  14.57807980 168.99375618 285.57409421 176.45920463 146.11671530
##     [11] 306.18667051 145.06692998 216.82260334 183.24268863  32.93589845
##     [16] 287.94399053  78.74807499  13.45905073 104.93463017 305.44116773
##     [21] 284.65258114 221.69708997 204.96218041 318.16632852 209.82585572
##     [26] 226.72974981 174.10112791 190.12544654  92.53111593  47.07636714
##     [31] 308.16775441 288.73569444 221.02568910 254.54957366  7.87637904
##     [36] 152.89471075 242.70705201  69.25053947 101.81792244  74.12025131
##     [41]  45.69600716 132.65482746 132.39178441 118.03054430  48.78231928
##     [46]  44.41794030  74.57091182 149.10798408  85.11124492 274.50486891
##     [51]  14.66597334 141.50402375 255.65595061  39.00776319 179.50335480
##     [56]  66.09004468  40.81012808 241.05851658 286.41451493 119.82808828
##     [61] 212.83686228  30.34901150 122.87028410  87.80276626 260.68481244
##     [66] 143.52522925 259.22059298 259.96464305 254.18954276 140.74614003
##     [71] 241.43205076 201.35076210 227.25836843  0.19992746 152.10130371
##     [76]  70.43804325 121.54129207 196.08672105 112.57533096  35.56333579
##     [81]  77.95823127 213.77778798 133.64696950 252.22266689  32.91668616
##     [86] 139.16567728 315.18623360 285.77635661 283.67009945  56.01684809
##     [91]  41.82262130 208.99261601 109.92527112 210.16260095 102.51943760
##     [96]  60.06115817 250.33417642  29.95039575 149.36929330 163.68174717
##    [101] 191.99646696 106.50353290 156.35617077 305.43162480 154.52876709
##    [106] 284.91207108 292.62021981 194.79519434 131.42072849  47.07030110
##    [111] 299.29593705  96.39324799  19.43058290 303.27262081 230.59080750
##    [116]  45.53417459 175.77108994 305.30919634 187.35467300 129.44329016
##    [121] 207.32591338 102.34259747  98.47040348  70.32564200 118.23643707
##    [126] 314.95014511  49.34473626  29.13407996  45.41021049 220.80227248
##    [131] 198.16207469 285.24611749 215.35970964 235.86487614 166.76343225
##    [136] 211.14830390 262.97774725 251.61009654 313.54301356 140.61809160
```

|    |       |              |              |              |              |              |
|----|-------|--------------|--------------|--------------|--------------|--------------|
| ## | [141] | 99.74470466  | 131.03198484 | 3.34947579   | 58.83184768  | 269.67338204 |
| ## | [146] | 73.97177026  | 76.51198581  | 24.54117291  | 78.63157697  | 234.28326577 |
| ## | [151] | 271.18501283 | 159.20872547 | 124.13088955 | 78.86367813  | 35.55086762  |
| ## | [156] | 124.79821928 | 183.01930048 | 69.40568410  | 142.32576065 | 69.75701399  |
| ## | [161] | 160.73586024 | 113.24946299 | 207.99525082 | 119.90846612 | 113.74252185 |
| ## | [166] | 170.78014255 | 236.90699533 | 70.75294010  | 132.07875796 | 85.01973979  |
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| ## | [486] | 77.06973589   | 312.17132616  | 302.42509272  | 29.12935064   | -120.55380786 |
| ## | [491] | 204.51558758  | -96.40603736  | 108.65607477  | -36.17826382  | 35.73478740   |
| ## | [496] | 174.04421685  | 87.88632634   | 210.57781289  | 544.97090837  | 369.30030347  |
| ## | [501] | -6.04660726   | 326.39476928  | 145.31969469  | 148.30763851  | 233.65552104  |
| ## | [506] | 103.17169380  | 98.11452937   | 62.93432981   | 185.53906134  | -3.40334676   |
| ## | [511] | 281.69084309  | 275.38778343  | 160.72201797  | 243.37000661  | 146.63733798  |
| ## | [516] | 263.32055777  | 392.56819034  | -100.95576542 | 118.88547756  | 231.64748241  |
| ## | [521] | 3.76859273    | 74.35334805   | 121.65944326  | 338.11371326  | 169.46403572  |
| ## | [526] | -113.77590275 | 264.82140082  | 163.98050258  | 124.12968911  | 173.73554209  |
| ## | [531] | 172.47549375  | 274.03419427  | -137.56038409 | 109.25478274  | -202.35187271 |
| ## | [536] | 142.89918299  | 166.94253238  | 151.18522600  | 217.81933006  | 59.90428737   |
| ## | [541] | 180.89377556  | 140.59664642  | 404.45913428  | 127.96759270  | 5.64671529    |
| ## | [546] | -88.96379702  | 187.17440027  | 167.40995803  | 251.09097173  | 170.04412399  |
| ## | [551] | -133.08161628 | 133.75271418  | 400.85843020  | 152.78717465  | 161.50408170  |
| ## | [556] | 327.24204052  | 82.77347575   | 360.23609636  | 206.57087873  | 61.83004942   |



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|----|-------|---------------|---------------|---------------|---------------|---------------|
| ## | [561] | 73.14510512   | 193.16678117  | 103.60275506  | 102.26791726  | 93.86390881   |
| ## | [566] | 298.87619359  | 100.46881539  | 123.40854012  | -89.83173391  | 85.16066110   |
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| ## | [576] | 116.24048890  | 546.94274711  | 81.46256434   | 97.60791275   | 239.67433349  |
| ## | [581] | 252.76785044  | 46.25976839   | -37.63407515  | 52.20450875   | 167.56789155  |
| ## | [586] | -50.72613320  | 161.71845050  | 301.36394323  | 269.76779985  | 160.39664271  |
| ## | [591] | -151.59417273 | 357.03131437  | 301.53132309  | 77.58537092   | 365.80467050  |
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| ## | [611] | 209.72496660  | 59.71062076   | 92.69963727   | 196.32285045  | 95.51982740   |
| ## | [616] | 239.97393331  | 165.85534909  | 230.48123647  | 149.05839959  | 352.93691837  |
| ## | [621] | 397.14222196  | 177.24011834  | 85.73756643   | 199.97595844  | -87.71369798  |
| ## | [626] | 253.26510432  | 97.86273814   | 144.27320067  | 266.62247863  | 276.23799350  |
| ## | [631] | 176.39125969  | 148.68660831  | -133.01799671 | 379.10787643  | 253.03000013  |
| ## | [636] | 536.72544184  | 115.22317403  | 298.29616059  | 116.39684659  | 38.85198762   |
| ## | [641] | 108.47184552  | 274.02567633  | 59.66309535   | 282.63179388  | 244.12000512  |
| ## | [646] | 365.46317762  | -103.17849442 | 401.53170307  | -210.78447149 | 233.76246069  |
| ## | [651] | 191.65642816  | 206.75472445  | 11.28791611   | 339.01747286  | 189.43781574  |
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| ## | [661] | 9.17217742    | 302.63645016  | 219.07212653  | -13.83069936  | 166.54010144  |
| ## | [666] | 155.79037321  | 421.53878151  | 208.62721756  | 78.08904737   | 318.48082963  |
| ## | [671] | 137.51059303  | -102.15619616 | 267.48746939  | 226.55196732  | 374.30595352  |
| ## | [676] | 122.50453363  | 183.09073290  | 7.13064739    | 210.88705558  | 108.81690293  |
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| ## | [686] | 37.33628238   | 375.73676922  | 217.52794489  | 217.54534601  | 176.31992747  |
| ## | [691] | 69.72168920   | -106.21324337 | 438.52548525  | 439.56365384  | 211.55449551  |
| ## | [696] | 112.61708327  | 151.47286850  | 345.64780362  | 8.40882519    | 212.48965383  |
| ## | [701] | 219.85935057  | -268.84673820 | 81.98787438   | 99.80857301   | 49.10468084   |
| ## | [706] | -74.62976800  | 234.86813127  | 38.66940491   | 406.33486695  | 325.33060298  |
| ## | [711] | 538.90647868  | 194.88210035  | 101.33636717  | 119.01642277  | 226.71640210  |
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| ## | [726] | 148.09783918  | 323.73649299  | 514.77283333  | 134.26688722  | 3.91471431    |
| ## | [731] | 201.64101312  | 102.14210684  | 176.42181694  | 130.89720780  | 38.60547774   |
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| ## | [741] | 245.90594186  | 303.71768862  | 375.96335335  | 360.69791141  | 220.55699754  |
| ## | [746] | 185.21875643  | 77.36312260   | 76.90265878   | 162.36739897  | 45.09137509   |
| ## | [751] | 124.32416143  | 30.39736638   | 192.35191082  | 205.10995112  | -0.96402883   |
| ## | [756] | -152.74293579 | -367.44385619 | 494.51163851  | 20.88689527   | 234.74001912  |
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| ## | [766] | 18.70534391   | -10.63249025  | 79.86287495   | 92.51862294   | 155.69506095  |
| ## | [771] | 124.05550677  | 220.48532460  | 124.56137035  | 180.00941541  | 206.05179815  |
| ## | [776] | 64.68556608   | 370.30258386  | 219.55733220  | 166.31381856  | 235.11302110  |
| ## | [781] | -41.16597224  | 201.41207758  | 296.37266612  | -10.52279355  | 10.04207218   |
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| ## | [791] | -18.50848572  | -27.14848887  | 63.81537853   | 72.34946951   | 287.68823840  |
| ## | [796] | 121.57856456  | 162.97946814  | 188.13936719  | 106.00706917  | 119.26039954  |
| ## | [801] | 502.54754470  | 108.74638873  | 468.33964279  | 183.18251829  | -19.75571356  |
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| ## | [821] | 423.01843800  | 209.29076336  | 462.92574800  | 79.92090728   | 275.49096448  |
| ## | [826] | 357.93317654  | 435.20769761  | 254.77895354  | 223.01688383  | -68.53256924  |

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| ## | [831]  | 211.67781548  | 479.68997340  | 93.71687822   | -83.66252300  | 309.09465067  |
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| ## | [841]  | 126.43587135  | 119.78812763  | 331.71518542  | 269.64866662  | 417.48161210  |
| ## | [846]  | 431.53253451  | 113.09528430  | 260.96913436  | 265.15349496  | 163.62496376  |
| ## | [851]  | 29.30311428   | 326.21303083  | -7.93327017   | 215.29069836  | 161.29812047  |
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| ## | [871]  | 357.16273562  | -197.17800660 | 15.76381657   | 295.13558660  | 348.23394627  |
| ## | [876]  | 217.06902643  | 127.40001204  | 369.25705765  | -5.92185116   | 113.40934085  |
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| ## | [886]  | 343.35500670  | 167.86263425  | 135.61440913  | 229.55646803  | 341.50492778  |
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| ## | [896]  | 347.89552702  | 72.93543958   | -55.59427192  | 480.19128700  | 331.29075918  |
| ## | [901]  | 31.34518660   | 141.31131979  | 127.24911732  | 192.39176548  | 303.67624845  |
| ## | [906]  | 37.42030060   | 152.06011191  | 58.87392003   | 314.55068852  | 430.78805711  |
| ## | [911]  | 60.73576227   | 89.20727662   | 241.47049027  | 407.31856230  | 251.48073144  |
| ## | [916]  | 194.25182057  | -22.12442127  | -287.77721022 | -76.74592626  | -156.26011239 |
| ## | [921]  | 222.29135646  | 160.22576405  | 153.86026026  | 286.29669691  | 135.39438232  |
| ## | [926]  | 375.65374125  | 57.34377428   | 165.73688589  | 141.46256397  | -80.02922429  |
| ## | [931]  | 368.41521912  | -109.96012711 | 496.57708793  | 85.84035207   | 149.38812176  |
| ## | [936]  | 195.97575553  | 63.94614205   | 408.47257580  | 109.46174216  | 253.97397124  |
| ## | [941]  | 97.25096578   | -71.97932798  | -101.76514309 | -139.38868600 | 325.82832416  |
| ## | [946]  | 96.06657896   | 194.75878174  | 106.95016917  | 164.78721754  | 362.94999375  |
| ## | [951]  | 291.99592362  | 374.72028509  | 262.40762049  | 304.99231007  | -32.57676305  |
| ## | [956]  | 14.49236633   | 15.44193840   | -43.57089974  | 63.13756005   | 152.98463665  |
| ## | [961]  | 113.64970998  | 334.37217857  | 236.57502196  | 35.77741327   | 80.36267524   |
| ## | [966]  | 340.29885908  | -106.03252181 | 102.49291009  | 96.86240063   | 60.91969445   |
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| ## | [981]  | 281.38146849  | 430.72449567  | 112.64424104  | 26.98495320   | 214.05328147  |
| ## | [986]  | 394.93222127  | 273.43324243  | 29.39205930   | 84.36298224   | 59.31708644   |
| ## | [991]  | 48.13406835   | 154.45490397  | 206.22250676  | 75.40819440   | 47.24055820   |
| ## | [996]  | 39.85369166   | 5.78907656    | 91.43477948   | 106.06565192  | 302.06183301  |
| ## | [1001] | 227.99375668  | 573.30622547  | 105.69680752  | 100.62920934  | -13.85147131  |
| ## | [1006] | 188.86488049  | 190.33711482  | 43.83510380   | -40.00981162  | 388.02853611  |
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| ## | [1021] | 192.07567094  | -16.54433799  | 161.43306790  | 153.70377403  | 190.22389087  |
| ## | [1026] | 185.04718638  | 25.05490562   | 243.19623292  | 176.90295850  | 125.84784336  |
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| ## | [1101] | 14.74062178   | 60.12957906   | -4.89820883   | 85.04620271   | 291.94197025  |
| ## | [1106] | 15.53045449   | 102.52674563  | 314.54394132  | 23.17189244   | 26.71999035   |
| ## | [1111] | 331.28657352  | 132.41065278  | 63.60500492   | 237.07376395  | 258.56002468  |
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| ## | [1136] | 362.74053542  | 40.52980098   | 70.69666207   | -111.57811490 | 265.36649142  |
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| ## | [1146] | 35.86188712   | 471.93104646  | 176.97288743  | 298.40072281  | 233.38775383  |
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| ## | [1156] | 341.08266398  | 16.45826067   | 12.87581655   | 385.32175752  | 276.47460474  |
| ## | [1161] | 81.96706092   | 275.38441951  | 348.37000150  | -222.46682015 | 123.20001743  |
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| ## | [1266] | -67.61333808  | 229.28379037  | 41.04096215   | 123.62591677  | 467.54452954  |
| ## | [1271] | -121.02365185 | 212.41396281  | 640.11831412  | 476.66194165  | -210.89783175 |
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| ## | [1296] | 323.80503133  | 427.16393614  | 48.41700957   | 29.20592791   | 36.60018733   |
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| ## | [1311] | 301.48597172  | 94.46024613   | 289.34961024  | 48.95987651   | 342.61281974  |
| ## | [1316] | 53.88269070   | 354.61521941  | 55.29525871   | 376.58937338  | 196.94039476  |
| ## | [1321] | 131.68600298  | 57.63331867   | -9.89336026   | 101.93345426  | -195.30037193 |
| ## | [1326] | 264.37622142  | 116.80077753  | 232.98340969  | 142.00594599  | 73.50345372   |
| ## | [1331] | 761.39234959  | 211.14526747  | 157.10428995  | -53.27744385  | 99.28869728   |
| ## | [1336] | 189.70542794  | 259.88106465  | 198.61883428  | -179.75066592 | 90.73795237   |
| ## | [1341] | 525.47567104  | 106.94693105  | 59.68341773   | 182.31803109  | 103.03659495  |
| ## | [1346] | 277.36324724  | 200.88639220  | 78.97994917   | -59.65336186  | 72.06456692   |
| ## | [1351] | 400.54859849  | 366.29575861  | 96.24016638   | 39.50953571   | 193.09389045  |
| ## | [1356] | 130.13101333  | -154.02509928 | -47.14180574  | 302.28334456  | 189.56553874  |
| ## | [1361] | 197.52862326  | 195.55115690  | -4.95674668   | 260.34538776  | 143.35927550  |
| ## | [1366] | 460.45068970  | 215.45709434  | 258.27669188  | 191.81414150  | 3.06560308    |

|    |        |               |               |               |               |               |
|----|--------|---------------|---------------|---------------|---------------|---------------|
| ## | [1371] | 363.47741579  | 221.85899078  | 216.87097883  | 411.06176729  | 260.04285588  |
| ## | [1376] | -50.50858153  | -81.83995621  | 184.46159273  | 431.40247702  | 105.74474040  |
| ## | [1381] | 199.55276659  | 203.00758630  | 270.93256224  | 307.37348651  | 309.04243965  |
| ## | [1386] | 267.51513400  | 109.32646298  | 157.30617694  | 248.99725780  | 323.67326488  |
| ## | [1391] | 274.67811105  | 247.17907199  | 483.66080672  | 212.04573657  | 200.09705995  |
| ## | [1396] | 233.79996827  | 331.49646957  | 334.33709455  | 115.47220357  | 423.04155562  |
| ## | [1401] | 51.66990809   | 172.77282570  | -55.12478151  | 80.34457421   | 90.37842912   |
| ## | [1406] | 55.24743000   | 87.56023642   | 303.18732268  | -25.60871945  | 70.13489423   |
| ## | [1411] | 270.72575515  | -113.96431894 | 281.44287365  | 82.71606821   | 297.36614099  |
| ## | [1416] | -29.17923308  | 73.74970238   | 152.35790432  | 116.10166034  | 12.40281242   |
| ## | [1421] | 223.35818806  | 246.35814402  | 387.06555342  | 336.28165970  | 50.45411264   |
| ## | [1426] | 147.04682258  | 334.06391733  | -36.81231979  | -84.59528950  | 224.71365185  |
| ## | [1431] | 31.64765433   | 238.57906382  | 557.77763328  | 316.82804297  | 267.32638376  |
| ## | [1436] | 116.94375781  | 418.82471164  | -50.38627993  | 329.01207271  | 348.88214890  |
| ## | [1441] | -70.43923751  | 5.50137547    | -35.96685949  | 238.14695256  | 305.25599683  |
| ## | [1446] | 44.04604632   | 356.15222861  | 47.58132020   | -106.98729528 | 14.47649488   |
| ## | [1451] | 311.73701103  | 178.29034068  | 167.14781325  | 238.20459823  | 49.34347394   |
| ## | [1456] | 335.40979873  | 64.39713238   | 83.32506275   | 10.92208130   | 76.47976294   |
| ## | [1461] | 335.49051421  | 302.15366483  | 144.66306043  | 48.29312876   | 147.37715876  |
| ## | [1466] | 5.57296887    | 106.54335544  | 46.77589585   | 128.52216182  | 85.27755871   |
| ## | [1471] | 126.31905813  | 243.19974349  | 228.14480307  | 89.21400113   | 275.58261348  |
| ## | [1476] | -145.73024611 | 367.55474967  | 359.97274928  | 276.27675944  | 209.78576287  |
| ## | [1481] | 13.63002179   | -80.31678555  | 321.50445958  | 163.26325012  | 440.33147007  |
| ## | [1486] | 43.90314477   | -11.29488280  | 42.99004106   | 132.81775996  | -37.01037397  |
| ## | [1491] | 484.46573803  | -79.15995211  | -91.67186581  | 111.96603483  | 37.70024183   |
| ## | [1496] | -18.58513948  | 573.84743362  | 9.24502997    | 351.17970050  | 388.34655711  |
| ## | [1501] | 83.40126219   | 262.71376256  | -112.16774958 | 95.38141902   | 71.63852337   |
| ## | [1506] | 238.46191387  | 385.80258332  | -59.17563287  | 397.16043048  | 448.88993840  |
| ## | [1511] | 110.06968629  | -90.81887629  | 247.21676961  | 176.43986864  | 33.46948614   |
| ## | [1516] | 462.49531703  | 44.44085310   | 195.63396745  | 228.74964400  | -82.67946600  |
| ## | [1521] | 393.97121074  | 456.67897533  | 248.57102175  | 347.99057165  | 65.53199028   |
| ## | [1526] | 112.17810309  | 249.13292414  | 210.71984791  | 29.86849835   | 170.89203416  |
| ## | [1531] | 358.09326514  | 44.21294039   | 79.67646872   | -15.98944281  | 280.84077536  |
| ## | [1536] | 30.12850003   | 252.88695538  | 5.41464124    | -3.48217066   | 146.36954390  |
| ## | [1541] | -37.56187866  | 394.07937370  | 206.01066293  | 107.51189263  | -64.65532068  |
| ## | [1546] | -220.81499832 | 398.22776047  | 448.68226496  | 294.25067492  | 5.72777028    |
| ## | [1551] | 386.17599251  | 290.22029571  | -51.47686592  | 446.24463132  | -114.48602904 |
| ## | [1556] | -146.22607948 | 245.12193286  | -19.34632754  | -179.34543156 | -50.96418215  |
| ## | [1561] | 628.87530360  | 241.18728051  | -55.05133063  | 86.91528868   | 227.37187848  |
| ## | [1566] | 109.37463231  | 217.51494538  | 118.52619163  | 298.17465870  | 291.12465232  |
| ## | [1571] | 310.08086327  | 130.27577992  | -93.63117251  | 461.10087539  | 83.65417157   |
| ## | [1576] | 82.98790321   | 554.16460420  | 314.74353895  | 144.15911216  | 272.78451433  |
| ## | [1581] | 215.68534227  | 185.03055458  | 85.14384120   | 361.06248414  | 271.01388127  |
| ## | [1586] | 131.11495968  | 283.42372519  | 158.13742866  | 192.02036022  | 394.26984845  |
| ## | [1591] | 218.46083646  | 219.97716004  | 288.58442305  | 80.76515499   | -15.53519814  |
| ## | [1596] | 352.28217110  | 365.89811708  | 284.39768369  | 334.48003309  | 385.25599202  |
| ## | [1601] | 75.75590374   | 379.48686427  | 184.32945055  | -214.99491842 | 241.15026266  |
| ## | [1606] | 215.44041623  | -398.19738396 | -4.31935758   | -12.69279926  | 104.64890166  |
| ## | [1611] | 112.48027291  | 228.50451860  | 232.80600562  | -155.69526058 | 143.58576859  |
| ## | [1616] | 61.10213699   | 203.51178111  | 131.67170505  | -14.93745299  | 61.94424428   |
| ## | [1621] | 254.40964493  | 82.27260171   | 120.68152167  | -68.42513166  | 153.29177488  |
| ## | [1626] | 207.72789855  | -48.78904925  | 494.83095690  | 481.20209597  | 210.76003821  |
| ## | [1631] | 293.09624706  | -93.44355862  | 153.87461060  | 220.28463268  | 54.68886099   |
| ## | [1636] | -221.57139200 | 131.48247557  | 109.90705167  | 120.61332085  | 164.71153940  |

|    |        |               |               |               |               |               |
|----|--------|---------------|---------------|---------------|---------------|---------------|
| ## | [1641] | 262.45768697  | 222.00552160  | 346.44354890  | 174.06172274  | 223.03493378  |
| ## | [1646] | 124.48217184  | 193.06791259  | -106.60831253 | -17.97755614  | 105.41759524  |
| ## | [1651] | 277.92070863  | -30.20318164  | 52.38420234   | 412.14594704  | 253.44183641  |
| ## | [1656] | -25.74423244  | 217.06014033  | 241.86354937  | 240.31191501  | 322.09568036  |
| ## | [1661] | 247.85435918  | -131.81649429 | 104.09013845  | 245.23044732  | 197.69768493  |
| ## | [1666] | 93.25817492   | 194.05739860  | 234.96218145  | 439.94603506  | 240.62444750  |
| ## | [1671] | 16.80272695   | 375.90312301  | 198.34657085  | 79.42194268   | 305.05239551  |
| ## | [1676] | 307.68847188  | 298.05553934  | 240.40451679  | -160.96790089 | 312.34328880  |
| ## | [1681] | 237.63779492  | -93.64721223  | 87.78447397   | 330.74858950  | -97.66409757  |
| ## | [1686] | 160.24152082  | 103.66956359  | 374.97610039  | 457.44227623  | 236.25417311  |
| ## | [1691] | 285.77244538  | -50.95146367  | 152.66267827  | 172.46653673  | 37.46649755   |
| ## | [1696] | 18.59699931   | 173.20752713  | 432.83118624  | 348.78785582  | 343.14759795  |
| ## | [1701] | 6.82889498    | 166.33801167  | -114.90188563 | 136.33593810  | -10.61601041  |
| ## | [1706] | 332.20083158  | 202.33099554  | -102.19967230 | -221.14685324 | 376.88305942  |
| ## | [1711] | 176.95478803  | 218.84507594  | 15.54356927   | 218.27304269  | 175.04867338  |
| ## | [1716] | 24.19172329   | 151.28033768  | 166.09834752  | 160.18102294  | 221.04726856  |
| ## | [1721] | 134.81105379  | -207.29899632 | 136.86162565  | 340.94150905  | -8.73937053   |
| ## | [1726] | 77.65603403   | 88.82173542   | 60.54938751   | -40.82805698  | 129.53261644  |
| ## | [1731] | 261.23882535  | 258.30383942  | 411.91445947  | 100.96108622  | 63.46741666   |
| ## | [1736] | 157.12823278  | 87.47105875   | 143.88314945  | -59.89168498  | 257.34156396  |
| ## | [1741] | 209.61429167  | 27.12960026   | 1.72995330    | 202.57158185  | 71.76412727   |
| ## | [1746] | -44.76378084  | 101.07836142  | 83.65945629   | 322.65827709  | 74.30286940   |
| ## | [1751] | 139.64742726  | -53.89599354  | 307.88971421  | 187.03482459  | -132.91522638 |
| ## | [1756] | 92.08715753   | 365.78737585  | 305.60190196  | 235.40478186  | 236.58546977  |
| ## | [1761] | 170.49168177  | 194.97167698  | -20.56654757  | 399.68348945  | 277.89811784  |
| ## | [1766] | 56.28080100   | 109.91144890  | 180.32695161  | 67.56324046   | -158.09040575 |
| ## | [1771] | 103.96612915  | 212.11174940  | 58.68097026   | -25.89033546  | 214.57375389  |
| ## | [1776] | 398.86475577  | -132.48696000 | 76.93268082   | -185.27031516 | 226.85169234  |
| ## | [1781] | -184.29003102 | 240.94512658  | 228.07873483  | 142.73849230  | 314.43182239  |
| ## | [1786] | 352.04532387  | 256.03181818  | 301.42283412  | 29.38011026   | 335.71106261  |
| ## | [1791] | 1.01073304    | 310.97190214  | 145.96225570  | 397.63541867  | 252.53573860  |
| ## | [1796] | 164.08024439  | 230.27829727  | 348.69050202  | -45.38597400  | 439.79557836  |
| ## | [1801] | 105.22749734  | 231.77139571  | -132.21369021 | 116.98706990  | 114.32301083  |
| ## | [1806] | 323.70655524  | 83.31059683   | 316.65014215  | 293.81385720  | -10.47839072  |
| ## | [1811] | 446.97907332  | -86.46640817  | -96.73323144  | 554.42015886  | -14.43910631  |
| ## | [1816] | 100.43595117  | 65.33255708   | 117.09763042  | 111.61211364  | 280.89974604  |
| ## | [1821] | 165.39556380  | 158.03044505  | 144.60783115  | 160.05424461  | 142.37632663  |
| ## | [1826] | 265.23190730  | 146.38350308  | 271.74388947  | 155.11329323  | 292.76930402  |
| ## | [1831] | 273.44074950  | 6.31794674    | -22.73912546  | -85.09152237  | -27.31925664  |
| ## | [1836] | -323.07958389 | 428.52842264  | 322.83842996  | 24.40164602   | 75.64918871   |
| ## | [1841] | 459.36621117  | -94.27434182  | 156.48419880  | -61.08455725  | 229.55241186  |
| ## | [1846] | 406.03994821  | 274.96619483  | 231.74729353  | 28.27034014   | 386.52869962  |
| ## | [1851] | 183.89925031  | 350.25968590  | 264.49204598  | 99.98897754   | 237.20905048  |
| ## | [1856] | 162.59839506  | 259.60579192  | -169.96119942 | 95.27294009   | -56.34717376  |
| ## | [1861] | 219.83970776  | -12.56245684  | -28.50317462  | 86.79625388   | 50.95616325   |
| ## | [1866] | 77.55413906   | 207.74624476  | 150.01841687  | 197.69114275  | -33.43620942  |
| ## | [1871] | 211.80508775  | 47.22922882   | 142.67153425  | -8.26901303   | 211.17124911  |
| ## | [1876] | 244.06845795  | 178.89840580  | 177.36274563  | 345.79736629  | 247.05541304  |
| ## | [1881] | 299.94655988  | 100.14553568  | 123.05765384  | 278.46792489  | 185.25326124  |
| ## | [1886] | 221.68929348  | 495.48062821  | 314.80973331  | 268.50389644  | 519.52405150  |
| ## | [1891] | 16.98884363   | 288.48511244  | 71.21401119   | 215.65400250  | -75.53356831  |
| ## | [1896] | -16.30221595  | 330.29435576  | -73.76400422  | -44.85832599  | 221.00787809  |
| ## | [1901] | 72.93696041   | 3.77426771    | -6.45133796   | 82.40396750   | 312.96762847  |
| ## | [1906] | 110.93354390  | 279.27976138  | -38.42991588  | 175.12397664  | 184.81990533  |

|    |        |               |               |               |               |               |
|----|--------|---------------|---------------|---------------|---------------|---------------|
| ## | [1911] | 180.59498435  | 17.34559672   | 165.48934641  | 281.65466010  | 157.38340805  |
| ## | [1916] | 226.00651952  | 271.88182736  | 373.94646481  | 150.29266672  | -48.81076767  |
| ## | [1921] | 295.64836711  | 383.47573896  | 160.42604230  | 9.71254435    | -58.29066053  |
| ## | [1926] | 29.73778032   | 181.19690419  | 186.39539212  | 199.46536237  | 130.00379122  |
| ## | [1931] | 60.12276225   | -53.66349490  | 304.44511422  | 217.00248976  | -72.31143936  |
| ## | [1936] | 181.65044764  | 151.78367712  | 317.29619966  | -71.99149293  | -102.95178577 |
| ## | [1941] | 142.38965750  | 297.07888292  | 150.17858384  | -46.35276246  | 281.15818763  |
| ## | [1946] | 683.01449351  | -39.06703384  | 249.47528094  | 216.72169901  | -64.89122529  |
| ## | [1951] | 411.70218551  | 94.60940827   | -114.66225150 | 36.93019916   | -4.61786787   |
| ## | [1956] | 348.01760827  | -147.95807931 | 260.66377506  | 354.69192605  | 408.69874667  |
| ## | [1961] | -26.96131133  | 452.05969015  | 404.85760298  | 343.13988771  | 280.01347889  |
| ## | [1966] | -102.91792533 | 102.44202454  | 198.65666957  | 403.28494911  | 161.74566538  |
| ## | [1971] | 199.11639661  | 75.18841927   | 292.33867460  | 232.14111056  | 101.75941606  |
| ## | [1976] | 121.22556494  | 597.61265071  | 160.28921118  | 37.77093964   | 145.52462668  |
| ## | [1981] | 84.93282895   | 109.10188069  | 47.55406965   | -100.27708471 | 408.99430831  |
| ## | [1986] | 337.68204710  | 283.87241640  | 241.15726245  | 92.85914136   | 75.44193313   |
| ## | [1991] | -68.03441463  | 437.27834595  | 425.73629031  | 23.45022459   | 203.04894913  |
| ## | [1996] | 22.24474187   | -82.84488990  | 157.26989169  | 50.50668354   | 185.58255581  |
| ## | [2001] | 117.72581664  | 268.56848192  | 203.45469661  | 366.55619528  | 18.59747930   |
| ## | [2006] | 28.71978670   | 147.59883190  | 357.37378219  | 2.35724777    | 235.06520396  |
| ## | [2011] | -3.96306207   | 312.48641081  | 63.15856660   | 154.00010962  | 483.75298930  |
| ## | [2016] | 196.94076099  | -35.31327069  | 265.56870466  | 137.14619459  | 133.58524488  |
| ## | [2021] | -15.29043050  | -159.49394404 | -79.74971070  | 276.40930359  | 241.34438210  |
| ## | [2026] | 85.88116160   | -40.98696856  | 116.67209173  | -21.38392313  | 106.78286338  |
| ## | [2031] | -281.29513154 | 409.10001241  | 187.47852056  | 437.21529842  | 244.16808598  |
| ## | [2036] | 44.65512351   | 53.26288841   | 238.11031858  | 244.80331942  | 326.70178653  |
| ## | [2041] | -167.72483754 | 314.15874295  | 2.66049282    | -83.09066468  | 302.08409456  |
| ## | [2046] | 199.70668747  | 157.22365416  | 187.84835469  | -185.44417560 | 106.75064762  |
| ## | [2051] | 185.22114330  | 348.70456908  | 7.88532950    | 168.06467374  | -17.56622222  |
| ## | [2056] | 123.04379430  | 306.67733000  | 401.81047048  | -179.35302244 | 71.80871149   |
| ## | [2061] | 458.56699659  | 15.01284137   | 212.84699929  | 42.52452523   | -30.93172523  |
| ## | [2066] | 153.68029530  | 140.36949729  | 362.14984502  | 21.65748489   | 271.75471357  |
| ## | [2071] | -11.11299257  | 94.75054607   | 154.85412886  | -54.67172359  | 202.03067664  |
| ## | [2076] | 394.59498270  | 111.32549432  | 337.56212272  | 198.19414222  | 14.23375081   |
| ## | [2081] | 415.74442071  | 119.02463154  | 107.52487873  | 278.30022978  | 176.61926587  |
| ## | [2086] | 158.33158595  | 316.86545171  | 250.88611644  | 399.64075388  | 136.54381931  |
| ## | [2091] | 261.55093674  | 175.86180410  | 202.33055999  | 105.03441502  | 464.54939985  |
| ## | [2096] | -0.96540550   | 132.67761928  | -19.96692766  | -6.66542873   | -15.86261743  |
| ## | [2101] | 63.39316188   | 92.85698587   | 12.44114735   | 40.39008893   | 114.32327545  |
| ## | [2106] | 3.97506665    | 403.08690212  | 220.78104043  | 56.99817911   | 103.39637608  |
| ## | [2111] | -17.31879599  | 481.28986653  | 153.27714073  | 275.78936436  | 113.51401995  |
| ## | [2116] | 421.28600276  | 154.61097129  | 65.76510095   | 114.69690458  | 183.08247732  |
| ## | [2121] | 130.62042632  | 259.94379581  | 359.68407065  | -38.99720279  | 182.06172730  |
| ## | [2126] | 120.82895853  | 62.54068267   | 134.09981590  | 214.63442929  | 180.89791712  |
| ## | [2131] | 137.52621228  | -81.57375361  | 246.14305381  | 252.94343974  | 240.59936080  |
| ## | [2136] | 228.99898995  | 87.62398061   | 248.41127785  | 623.58229208  | 93.49097164   |
| ## | [2141] | 264.15168471  | 138.50623231  | 122.35025602  | 213.67871585  | 320.97594076  |
| ## | [2146] | 162.58702458  | -10.17279288  | 13.24489498   | 136.77079482  | -81.95040120  |
| ## | [2151] | 434.76596491  | 452.08658146  | 263.30540409  | 77.40394527   | -22.19018085  |
| ## | [2156] | 432.62799981  | 197.68000993  | 151.74020037  | 140.69391873  | -30.83765980  |
| ## | [2161] | 9.51187122    | -1.16211119   | -36.49808353  | 225.28719205  | 287.66467971  |
| ## | [2166] | -55.84196292  | 4.65863963    | 44.52845724   | 55.86819261   | 169.71824793  |
| ## | [2171] | 37.47382159   | 244.49356249  | 49.89691533   | 139.29006581  | 283.74751498  |
| ## | [2176] | 284.57091792  | 39.93240814   | 222.16089760  | -92.98558327  | 201.76921395  |

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|----|--------|---------------|---------------|---------------|---------------|---------------|
| ## | [2181] | 154.47218809  | 212.15557204  | 153.72551231  | -181.89810295 | 227.46823329  |
| ## | [2186] | -40.45885072  | 134.15069642  | 57.76884079   | 199.58670751  | 275.23839021  |
| ## | [2191] | 53.26544362   | 85.48105780   | -28.07439152  | -135.51055159 | -31.13365985  |
| ## | [2196] | 79.08061115   | 94.23058215   | 287.66666311  | 101.79456539  | 8.38490075    |
| ## | [2201] | 101.14861105  | 139.24063307  | 203.90545767  | 299.74401191  | 316.52279180  |
| ## | [2206] | 270.49953717  | -196.19144552 | -54.92348464  | 149.69284299  | 35.61106964   |
| ## | [2211] | -16.59935297  | 45.81219447   | 257.41558704  | 237.29153879  | 347.36743693  |
| ## | [2216] | 157.72601963  | -49.02260277  | 413.00251260  | 38.60905381   | 182.73851106  |
| ## | [2221] | 156.91688606  | 214.06231451  | -17.60810697  | -80.82808681  | 252.03268098  |
| ## | [2226] | 92.07654702   | -139.77041891 | -45.15902794  | 242.21877409  | 153.58610099  |
| ## | [2231] | 13.84421618   | 258.40848566  | 193.09756705  | 162.89802206  | 374.81737868  |
| ## | [2236] | 58.96491490   | 185.24167205  | 404.62666374  | 129.77346172  | 479.12961083  |
| ## | [2241] | 191.93937380  | 202.07461412  | 407.27299104  | 165.63738140  | -8.70778879   |
| ## | [2246] | -102.82001423 | 82.27811583   | 30.95434852   | 45.43618146   | 345.23518878  |
| ## | [2251] | 328.58285137  | 217.16366424  | 209.75856713  | -62.69621791  | 408.84130726  |
| ## | [2256] | 180.04742772  | -26.76766358  | 382.25499583  | 415.88633736  | 367.75806456  |
| ## | [2261] | 233.98480501  | -0.98148244   | -61.29879704  | 408.23167461  | 222.81840194  |
| ## | [2266] | 103.80244524  | 48.45038401   | 322.89799521  | 12.96100600   | 324.96623032  |
| ## | [2271] | 333.59426564  | 126.55974756  | 237.70389380  | 350.80084971  | 234.90147144  |
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| ## | [2281] | 391.98769584  | 465.73947100  | 117.41807585  | 222.34795674  | 220.10443387  |
| ## | [2286] | 143.83564524  | 186.19308990  | 114.51553469  | -12.70774585  | 360.30755430  |
| ## | [2291] | 247.54401868  | 54.32510629   | 171.55503792  | 245.27771357  | -119.41474176 |
| ## | [2296] | 177.47058610  | -38.19661896  | 88.12401975   | -95.35343799  | -100.74760353 |
| ## | [2301] | -185.21138965 | 263.60523611  | 467.21016116  | 346.66643385  | 10.77612156   |
| ## | [2306] | 48.19489216   | 356.14133128  | -161.72396899 | 68.24630623   | 123.57442953  |
| ## | [2311] | -107.80819313 | 406.49169176  | 227.52104988  | 350.33708939  | 105.23036312  |
| ## | [2316] | 176.75399345  | 203.41836321  | 395.75512991  | 412.46080523  | 60.39447060   |
| ## | [2321] | 336.07560024  | 236.93426912  | 295.53094094  | -65.13271530  | 116.89577408  |
| ## | [2326] | 378.71009416  | 182.05421796  | 173.93146395  | 60.92533288   | 333.29609653  |
| ## | [2331] | 168.50431238  | 186.34209652  | 41.15122554   | 348.96198422  | 165.62490268  |
| ## | [2336] | 345.46344112  | 147.17495426  | 170.04996412  | 189.63006121  | 84.98862857   |
| ## | [2341] | -149.61604648 | 38.16818973   | 23.07548733   | 115.83132490  | 10.20793204   |
| ## | [2346] | 133.21310902  | 147.05433386  | 418.00035852  | 127.30636781  | 466.61595806  |
| ## | [2351] | 173.23807178  | 173.60195868  | 233.52343275  | 175.74956286  | 13.20238231   |
| ## | [2356] | 226.19548896  | 328.70005662  | 243.68324628  | 171.72486732  | 32.02089161   |
| ## | [2361] | 319.45575556  | 225.45745711  | 100.94884551  | 61.92074703   | 124.16363142  |
| ## | [2366] | 279.56184048  | 91.73585055   | 295.91300991  | -38.26399896  | 300.65957664  |
| ## | [2371] | 146.93095085  | 378.56147490  | 230.74536554  | 261.23032753  | -92.17039261  |
| ## | [2376] | 126.53416647  | 150.42211903  | -105.26225596 | -59.39831615  | 173.68976875  |
| ## | [2381] | -39.99190287  | 55.26071550   | 275.40076514  | 285.05600936  | 96.40171863   |
| ## | [2386] | 153.24410937  | 304.26285679  | 30.13235829   | 96.94051877   | 357.12248774  |
| ## | [2391] | 174.91466820  | -64.08173596  | 109.21352917  | -81.64278606  | 44.13892906   |
| ## | [2396] | -43.89007142  | 5.47848877    | 24.08488387   | 83.50643212   | 431.08252863  |
| ## | [2401] | 174.17479754  | -124.00379004 | -156.09874671 | 17.43598567   | 403.34374536  |
| ## | [2406] | 427.08538052  | 8.23205822    | 290.01642098  | 356.88187973  | -24.35837531  |
| ## | [2411] | -131.06063147 | 0.43187506    | 44.36059374   | 80.57707545   | 463.47641299  |
| ## | [2416] | 160.27275808  | 184.39152107  | 142.35390280  | 28.39478127   | 1.43309647    |
| ## | [2421] | 399.72007636  | 111.72319148  | 220.46731730  | -35.73497247  | 294.85846674  |
| ## | [2426] | 76.79130074   | 196.91932268  | 138.68804937  | -169.40586228 | 367.58543059  |
| ## | [2431] | 324.71946170  | 28.54658818   | 184.85020407  | -8.13253338   | 293.66161495  |
| ## | [2436] | 267.44264374  | -205.92972489 | -83.02167317  | 23.22606285   | 172.82113775  |
| ## | [2441] | -29.36665824  | 266.10474905  | 140.36621222  | 166.98282348  | 14.24837094   |
| ## | [2446] | 255.98668597  | 188.01018226  | 161.84611390  | 138.83356090  | 55.49812349   |

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| ## | [2451] | -35.55507141  | 5.22328960    | -190.45719178 | 220.42422086  | 287.23269256  |
| ## | [2456] | -20.08817323  | 269.03992414  | 31.02735574   | 110.27321377  | 87.27586387   |
| ## | [2461] | -259.90968894 | 235.27494432  | 140.81688226  | 211.15662458  | 549.76248554  |
| ## | [2466] | 183.84067566  | 486.89202558  | 229.50289035  | 302.27559326  | 22.90876572   |
| ## | [2471] | 245.84913383  | 45.72953413   | 57.15063033   | 86.69445717   | 183.67917837  |
| ## | [2476] | 67.78097841   | 58.70956271   | 374.22750913  | 112.21076773  | -62.09539477  |
| ## | [2481] | -35.43993978  | -27.70481312  | 248.96572545  | 198.15549468  | -42.83169200  |
| ## | [2486] | 98.02836086   | 149.16650043  | 304.80896969  | 460.91754497  | 308.72992862  |
| ## | [2491] | 26.19252154   | 124.70832112  | -176.56236276 | -106.84920688 | -15.67405728  |
| ## | [2496] | -106.49939300 | 152.07989937  | 409.48846820  | 95.26016959   | 285.76417595  |
| ## | [2501] | 278.26066600  | 325.93686256  | -21.39350770  | -32.84957027  | 426.99291522  |
| ## | [2506] | 405.78526927  | 144.49066325  | 181.24379028  | 75.80149460   | -42.28434527  |
| ## | [2511] | 285.64024848  | -78.18867787  | 92.08689272   | -58.69329622  | 289.40123907  |
| ## | [2516] | -137.30970781 | -7.05067188   | 182.10088808  | 288.79117635  | -150.54105374 |
| ## | [2521] | 423.96255007  | 376.96059488  | 291.68273827  | 210.49067327  | 104.82790686  |
| ## | [2526] | 166.31186263  | 74.77066295   | 134.97289795  | 360.74262259  | 80.46494655   |
| ## | [2531] | 49.94363343   | 269.27487626  | -67.03255121  | 161.64957956  | 292.36121043  |
| ## | [2536] | 264.64339482  | 180.52333319  | 193.41403186  | 196.97596528  | 205.42882583  |
| ## | [2541] | 245.79536623  | 56.20000032   | -234.58120466 | -54.83736916  | 166.71871193  |
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| ## | [2551] | 175.41700757  | 87.23279148   | 200.54581820  | 442.69393671  | 104.98309219  |
| ## | [2556] | 145.44323347  | 159.46043858  | 479.02190077  | 52.76979891   | 318.22211294  |
| ## | [2561] | 246.91754708  | 204.67049776  | 212.78061237  | 430.84030961  | 429.77674105  |
| ## | [2566] | 304.74673434  | -200.42151113 | 218.13220488  | 220.20628420  | 228.23678154  |
| ## | [2571] | 161.68926895  | 243.03425842  | 400.81936840  | 163.40003331  | 230.19016547  |
| ## | [2576] | -13.85636940  | 164.31666900  | 272.06541959  | 328.19882268  | 130.37333589  |
| ## | [2581] | 156.63867201  | -180.75861872 | 364.78928211  | 285.30232585  | 135.91967516  |
| ## | [2586] | 251.29869734  | 211.30426934  | 184.76708861  | 449.49717284  | -43.12505533  |
| ## | [2591] | 29.27196138   | 228.86527163  | 175.03617502  | 55.66685450   | 321.38694005  |
| ## | [2596] | 274.61493180  | 350.16531075  | 2.25360053    | -147.98532483 | 158.46800534  |
| ## | [2601] | 104.13479610  | -156.94719835 | 3.53626618    | 136.39122774  | -165.86199584 |
| ## | [2606] | -163.84436646 | 304.31749337  | -32.06359621  | 19.92031337   | 215.09934218  |
| ## | [2611] | -54.07338541  | 30.18893936   | 291.09963614  | 37.43270703   | 290.03133126  |
| ## | [2616] | -263.95201334 | -64.47099782  | 289.68776230  | 253.19415117  | 160.33209049  |
| ## | [2621] | 99.06417088   | 87.53946415   | 158.09378890  | 370.10654498  | 87.31582962   |
| ## | [2626] | 372.40245737  | -152.35806774 | 178.16606729  | 471.41649103  | 242.81659662  |
| ## | [2631] | -78.30657274  | 381.82233691  | 5.35030929    | 184.55608002  | 338.41531174  |
| ## | [2636] | 30.76873648   | 130.79254428  | -49.80361483  | 294.83814365  | 184.41448464  |
| ## | [2641] | 229.62316314  | 33.30739817   | 45.61547878   | 111.96914452  | 104.61563213  |
| ## | [2646] | 104.50288807  | 74.23464907   | 225.70672615  | 89.70778851   | 56.64361805   |
| ## | [2651] | -84.45406015  | 356.38848699  | -170.28775236 | 120.79257339  | 102.82817443  |
| ## | [2656] | 220.38938620  | 23.32413425   | 96.40209738   | 352.66985839  | 49.19069861   |
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| ## | [2671] | 244.59182826  | 167.41129215  | 218.82124769  | 153.07441696  | 338.94526920  |
| ## | [2676] | 219.63295226  | 287.54752815  | 88.99016029   | 65.10808203   | 317.89056766  |
| ## | [2681] | 190.85162130  | 129.08987521  | 223.84809862  | 67.93021224   | 383.69295776  |
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| ## | [2701] | 278.09582836  | 54.70723874   | -231.31445168 | 206.89355864  | 4.04121708    |
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| ## | [2716] | 69.32917317   | 335.66349735  | 86.42873578   | 123.59612352  | 231.91160607  |



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| ## | [2721] | 341.13700955  | -104.58428922 | -16.22606344  | 12.93502436   | 208.84628890  |
| ## | [2726] | 141.32443012  | 341.86732675  | -31.38507103  | 143.56572956  | 209.79928177  |
| ## | [2731] | -165.47994937 | 57.56099158   | 452.27694265  | 117.40710799  | 91.87490932   |
| ## | [2736] | 318.17036382  | 289.61192301  | 285.20920002  | 188.18175817  | 112.03673971  |
| ## | [2741] | 257.43935988  | 223.14562782  | 249.99154585  | 370.63548462  | 80.46886453   |
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| ## | [2751] | -17.10898955  | 11.09201753   | 137.63060953  | 78.99823111   | -4.05555215   |
| ## | [2756] | 126.10107382  | 260.26688759  | -92.26084654  | 557.82043278  | 147.51282185  |
| ## | [2761] | 299.17796084  | 163.33736147  | 319.79838301  | 333.12101396  | 475.50911634  |
| ## | [2766] | 25.06335282   | 500.74696603  | 160.32656613  | 103.26329171  | -315.34117780 |
| ## | [2771] | -157.40390785 | 114.10273364  | 244.15082023  | 68.39134137   | 108.10939557  |
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| ## | [2781] | 172.20083786  | 222.07188936  | 90.69021657   | 203.78961214  | 390.19014758  |
| ## | [2786] | 118.97479342  | 361.63718278  | 86.11233303   | 138.74777634  | 165.51525475  |
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| ## | [2806] | 114.86436253  | -225.80463149 | 159.66791914  | 241.28394109  | 75.74909404   |
| ## | [2811] | 390.72589663  | 50.01158142   | 156.60996985  | 354.23307645  | 176.02740988  |
| ## | [2816] | -191.41411819 | 163.12230170  | 184.77705866  | 91.07033225   | 193.98311875  |
| ## | [2821] | 329.36097994  | 177.06497354  | 7.52830258    | 384.37013516  | 476.66337266  |
| ## | [2826] | 304.23452443  | 246.92878624  | 123.13584131  | -39.97132946  | 182.69483435  |
| ## | [2831] | -37.13427109  | 260.10263560  | 312.47733395  | 295.11922481  | 266.96153919  |
| ## | [2836] | 185.03322112  | 256.56659413  | 418.29631711  | 167.81046429  | 444.73686984  |
| ## | [2841] | 119.52139888  | 436.17540188  | 185.15624573  | 277.84464604  | 89.03147027   |
| ## | [2846] | 1.80696160    | 93.01262857   | 216.04202949  | 75.24656260   | 380.10161948  |
| ## | [2851] | 329.11792498  | 257.13859536  | 91.26059491   | 214.27897280  | 127.91210207  |
| ## | [2856] | 424.95897702  | 48.67307121   | 193.57071506  | 57.39078223   | 238.10102853  |
| ## | [2861] | 627.19056695  | 200.65266271  | 190.83748060  | 229.66265947  | 144.84492263  |
| ## | [2866] | 413.38140422  | 145.47828905  | 136.75791721  | 232.96812270  | 170.16677405  |
| ## | [2871] | 98.25052169   | 2.30131037    | 336.91844674  | 245.74533498  | 43.22135499   |
| ## | [2876] | 238.21017543  | 44.61860836   | 255.91522906  | 104.58876200  | 115.30200272  |
| ## | [2881] | 212.08290527  | 12.96599786   | 337.83728743  | 231.43520866  | 90.29406634   |
| ## | [2886] | 467.57861256  | 3.16538350    | 458.86436523  | 280.76385345  | 71.82402794   |
| ## | [2891] | 153.79955968  | 66.47535223   | 366.28282993  | 208.16854211  | 248.61997277  |
| ## | [2896] | 490.18030692  | -217.72276318 | 49.07031450   | 263.53474581  | -21.87801751  |
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| ## | [2906] | 233.46903074  | -36.76974926  | 382.55902582  | 370.53141682  | 419.46882667  |
| ## | [2911] | 246.01397824  | 261.36547323  | -39.92580693  | 202.31548272  | 345.54856947  |
| ## | [2916] | -68.03772713  | 238.11591073  | -141.36696075 | 403.61674613  | 43.31335783   |
| ## | [2921] | 247.77982807  | 34.58523794   | 158.65102655  | -103.10697317 | -255.16468217 |
| ## | [2926] | 310.06441781  | 235.01916825  | 345.39867464  | 320.99631619  | 105.47960647  |
| ## | [2931] | 64.50013502   | 300.95009623  | 330.20653276  | 239.75640836  | 173.70161120  |
| ## | [2936] | 66.50250623   | 304.62544509  | 290.58155609  | 240.34329847  | 571.60478375  |
| ## | [2941] | -47.32688907  | 79.51873397   | 198.93668486  | -29.27713340  | 58.86674516   |
| ## | [2946] | -51.78629532  | 431.11056328  | 64.86396540   | 226.99021084  | 489.78759732  |
| ## | [2951] | 242.29510883  | 52.57609810   | 271.32576708  | 164.65482045  | 81.66213472   |
| ## | [2956] | -136.51338389 | 480.80664146  | 51.42753257   | 147.77642410  | 133.76008203  |
| ## | [2961] | 61.09449468   | 349.97064365  | 201.76173903  | -44.88194052  | 183.44231490  |
| ## | [2966] | 642.31219090  | 183.69116358  | 262.72971761  | 334.53331931  | 69.98297431   |
| ## | [2971] | 330.32547715  | 474.00574376  | 199.40545273  | 352.95936924  | 122.65777545  |
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| ## | [2981] | 390.98312716  | 226.93223025  | 395.53888808  | 438.85348341  | 390.33819803  |
| ## | [2986] | 347.15520855  | 281.49947368  | -141.22581814 | 135.11584796  | 31.54770492   |

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| ## | [2991] | 462.80071636  | 216.32201020  | 111.59472192  | 71.62562651   | 87.93931918   |
| ## | [2996] | 309.17024286  | 41.78519590   | 420.64484755  | -64.09019923  | 168.70148178  |
| ## | [3001] | -209.96378028 | 209.28311305  | -74.05574876  | 47.30114683   | -154.25917942 |
| ## | [3006] | 262.98237153  | 103.33553141  | 194.56449056  | 30.67159806   | -27.46140970  |
| ## | [3011] | -77.73135862  | 35.50440655   | 115.46560674  | -237.36582289 | -14.87709153  |
| ## | [3016] | -83.45006840  | 87.33086319   | -129.87110446 | 114.77958883  | 422.79466290  |
| ## | [3021] | 105.53774169  | 244.20230363  | 154.47574417  | 130.83928428  | -118.78782285 |
| ## | [3026] | 364.37305034  | 460.27200852  | 313.97750015  | 63.67388746   | 191.03175924  |
| ## | [3031] | -71.46856222  | 200.84055146  | 72.22514161   | -31.22323134  | 126.59751647  |
| ## | [3036] | 271.19752768  | 365.17348149  | 133.55318372  | 381.02169768  | 339.20267364  |
| ## | [3041] | 88.79151990   | -56.77635876  | -36.08601967  | 340.15357575  | 260.10333878  |
| ## | [3046] | 50.28037641   | -120.99107903 | 24.88055770   | 221.06667753  | 183.96433085  |
| ## | [3051] | 13.53670512   | 233.04152147  | 1.83694601    | 242.13713017  | 20.10115923   |
| ## | [3056] | 134.98851854  | 414.53997020  | 101.20033977  | 58.83233293   | 354.31552930  |
| ## | [3061] | -38.37332771  | 181.14036152  | 529.06969819  | 295.38630902  | 41.97886275   |
| ## | [3066] | 259.88925687  | 349.15606991  | 120.42085545  | 202.90811689  | -21.24323646  |
| ## | [3071] | 328.09084090  | 355.48662262  | -71.64578457  | -38.77419767  | 105.71866751  |
| ## | [3076] | 3.80156532    | 52.09564244   | -51.71574277  | 21.86187847   | 416.23847062  |
| ## | [3081] | -163.39336436 | -209.82893234 | 216.48817068  | 252.55912190  | -42.54511339  |
| ## | [3086] | 365.09742035  | 106.37057874  | -135.22275360 | 46.96897193   | -90.90674134  |
| ## | [3091] | -116.30969078 | 187.32123607  | 282.53993945  | -56.86527149  | 163.57450312  |
| ## | [3096] | 139.74862116  | 390.84475457  | -6.28258792   | -17.07879832  | -59.93226176  |
| ## | [3101] | 250.83535881  | 233.45012644  | 55.52867263   | 56.42576356   | -21.79670713  |
| ## | [3106] | 203.48299769  | 409.87636388  | 87.96023940   | 312.79407326  | 97.47290009   |
| ## | [3111] | 239.02082996  | 429.10412031  | 86.55501588   | 343.45004856  | -44.94653474  |
| ## | [3116] | 260.96944897  | 56.57682749   | 127.84216273  | 156.46235481  | 201.16375361  |
| ## | [3121] | 305.26940799  | 50.84603513   | 239.52762630  | 365.29652765  | 171.84652639  |
| ## | [3126] | -133.75932454 | -105.70969488 | -51.86477760  | 214.63394111  | -169.23774543 |
| ## | [3131] | 291.19435745  | 203.34956519  | 351.81571811  | 255.32965695  | 148.54618784  |
| ## | [3136] | 41.19439467   | 145.62547415  | -187.22504739 | 385.21579054  | 240.11182618  |
| ## | [3141] | 387.86666120  | 449.08119893  | -8.67842318   | 322.08010615  | 418.94901647  |
| ## | [3146] | 116.54400734  | 91.12826402   | 375.81399118  | 280.18862346  | 171.93021933  |
| ## | [3151] | 107.88945085  | 84.90696083   | -4.54130824   | 271.24216277  | 139.08480418  |
| ## | [3156] | 1.16781867    | 321.09434709  | 130.94955021  | 28.18870042   | 135.48694333  |
| ## | [3161] | 318.38991200  | 213.28838534  | 53.64348311   | 241.27233907  | 255.42532971  |
| ## | [3166] | 191.48601444  | 281.10735894  | 213.76404336  | 142.52928747  | 20.61976783   |
| ## | [3171] | 109.53390143  | 176.51090202  | -15.16975940  | 414.43302252  | 237.27514304  |
| ## | [3176] | -189.08174227 | 52.24332229   | 87.71196488   | 163.65529485  | 297.35675079  |
| ## | [3181] | -280.83905871 | 165.61268669  | 212.56348362  | 62.15107022   | 92.56937621   |
| ## | [3186] | 458.16982360  | 21.95147932   | 91.31595461   | 38.07368412   | -145.88228781 |
| ## | [3191] | -219.82429984 | -32.34320004  | 521.73518320  | 86.49509140   | 131.32897893  |
| ## | [3196] | 261.57539683  | 309.55376922  | 227.95460504  | -40.30303342  | 141.28769816  |
| ## | [3201] | 456.76522181  | 196.45332156  | 432.77441467  | 164.67215046  | 44.02440023   |
| ## | [3206] | 175.51247642  | 168.46512854  | 214.86213573  | 459.92076798  | -61.75831994  |
| ## | [3211] | 391.87834965  | 142.39180618  | 342.02628803  | 241.12913810  | 18.63397384   |
| ## | [3216] | 68.21516032   | 243.42863718  | 420.42998746  | 15.86373779   | 318.47322889  |
| ## | [3221] | 281.74596892  | 258.91673651  | 277.33741793  | 197.65184342  | 345.26714744  |
| ## | [3226] | 254.37188230  | 300.04400374  | -37.68717298  | 74.56075282   | -2.99425673   |
| ## | [3231] | 277.20612463  | 146.37306894  | 405.92709300  | 60.11510188   | 206.11303308  |
| ## | [3236] | 95.88510874   | 254.01557169  | 201.41947389  | 26.23178575   | 296.72955268  |
| ## | [3241] | 33.99489519   | 289.49524803  | 316.93412218  | 340.97628317  | 190.57369229  |
| ## | [3246] | 336.70720974  | 88.93365128   | 189.06907992  | 334.06373521  | 122.83656952  |
| ## | [3251] | 306.95223448  | 455.03405364  | 119.88593233  | 166.15606348  | 311.45183817  |
| ## | [3256] | 94.91974851   | 156.07041159  | 188.71395517  | 275.17940772  | 163.59277179  |

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| ## | [3261] | 141.60757260  | -122.26016401 | 73.92991795   | 318.55830353 | 201.86878679  |
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| ## | [3276] | 77.04010864   | 296.24535799  | 176.83718897  | 75.92937713  | -36.57885348  |
| ## | [3281] | 297.41678073  | 20.23251217   | 132.62571257  | 157.66865862 | 307.98439568  |
| ## | [3286] | 50.49352079   | 61.04532983   | 362.87037848  | -51.66073506 | 398.12495646  |
| ## | [3291] | 8.10596206    | 287.38666153  | 103.55173886  | 167.75467798 | 209.98710282  |
| ## | [3296] | 373.33352498  | 214.42172365  | 241.65607424  | 328.24979600 | 240.49454818  |
| ## | [3301] | 361.72242333  | 146.98913682  | -31.60927417  | 199.75437129 | 424.11677405  |
| ## | [3306] | 226.14045403  | 138.02373876  | 266.56552194  | 40.68804946  | -48.40466956  |
| ## | [3311] | 282.03929456  | 223.25579305  | 102.91075256  | 61.54309204  | 253.86743592  |
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| ## | [3321] | 135.63128491  | 350.39301453  | -14.76680682  | 445.42159051 | 197.53163178  |
| ## | [3326] | 133.68443800  | 194.23197079  | 143.08010717  | 262.69449858 | 148.13769499  |
| ## | [3331] | 349.47768675  | 159.64176434  | 16.08918500   | 226.90226279 | 378.10008133  |
| ## | [3336] | 254.35585204  | 362.04814363  | 33.17923731   | 177.76903784 | 247.34556265  |
| ## | [3341] | 292.13189652  | 266.91219029  | 198.85994427  | 55.09559708  | 146.29787722  |
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| ## | [3371] | 68.46998918   | 231.39801423  | 124.80163911  | 112.10610020 | -183.69940105 |
| ## | [3376] | 70.73803418   | -52.30085335  | 205.86628766  | 153.54498928 | 64.24677520   |
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| ## | [3386] | 232.16505413  | 307.63071581  | 273.36724017  | 252.73945226 | 260.70126218  |
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| ## | [3401] | 190.23827540  | 15.15043546   | 115.73204550  | 206.89472726 | 10.48581524   |
| ## | [3406] | 234.06541253  | 331.61051228  | 392.38114241  | 480.19587076 | 30.50526908   |
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| ## | [3426] | 148.51157343  | 311.46425702  | 507.69695236  | 58.93476717  | 155.94720814  |
| ## | [3431] | 288.49892638  | 152.39971198  | 242.09563855  | 456.51002734 | 394.97446725  |
| ## | [3436] | 140.48250325  | 268.52230180  | 257.83444452  | 134.77811525 | -24.21052384  |
| ## | [3441] | 93.11495641   | 218.36831057  | 276.44658001  | 93.56302367  | 124.31439192  |
| ## | [3446] | 81.09287782   | -120.72786930 | 18.77084447   | 189.21795999 | 113.81683906  |
| ## | [3451] | 95.01650028   | 81.06824063   | -17.88653968  | 302.22073389 | 205.73427325  |
| ## | [3456] | -65.54674627  | 13.45465499   | 197.70636163  | 42.47282028  | 76.19071083   |
| ## | [3461] | 160.12151680  | 238.40320151  | 193.38275618  | 330.02896469 | 98.74284545   |
| ## | [3466] | -29.41471227  | 215.55584797  | 119.68604707  | 81.18717280  | 134.55554753  |
| ## | [3471] | 601.12590866  | -168.39144733 | 168.90518657  | 104.09528766 | 54.38180362   |
| ## | [3476] | 150.13376882  | 43.13988753   | -96.70109326  | -74.12844559 | 166.58679576  |
| ## | [3481] | 411.57984012  | 109.19795496  | 278.32001889  | 226.11619392 | 111.23898873  |
| ## | [3486] | 426.85530176  | 337.19251384  | 102.68037321  | 310.45148414 | 192.84444558  |
| ## | [3491] | -19.19872744  | -2.53106031   | 361.28843560  | -0.19707694  | 94.74818857   |
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| ## | [3511] | 238.94511040  | 181.96586888  | 13.00218315   | -42.26531566 | 210.90730606  |
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| ## | [3521] | 117.04106380  | 182.71941461  | 270.14725366  | 116.00550462 | 106.93619627  |
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| ## | [3531] | 164.41783941  | 11.17123526   | 412.06943391  | 326.33309079  | 238.90121791  |
| ## | [3536] | 288.42474698  | 231.72946819  | 463.40090679  | 182.85369861  | 637.33058601  |
| ## | [3541] | 285.98374626  | 177.58982426  | 141.52336321  | 238.86178126  | -236.10669547 |
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| ## | [3551] | -92.10769701  | 495.44853644  | 79.39728905   | 388.38613107  | 217.39854959  |
| ## | [3556] | 42.16355036   | 319.38391433  | 446.10462997  | 174.36324519  | 141.69138578  |
| ## | [3561] | 323.41515964  | 107.76803746  | 10.86761251   | 234.21565079  | 149.95922356  |
| ## | [3566] | 120.91994066  | 278.88544014  | 302.49428909  | -219.17483785 | 275.33018501  |
| ## | [3571] | 361.18435410  | 99.11620896   | 250.21352438  | 229.84893723  | 178.95991755  |
| ## | [3576] | 181.03708526  | 256.43554866  | 385.96910525  | 285.92225900  | 215.43991018  |
| ## | [3581] | 382.02840788  | 232.89765829  | 173.33975879  | 254.94053603  | 63.98898816   |
| ## | [3586] | 260.39016684  | 326.02072623  | 154.37749896  | 223.05950138  | 37.93414308   |
| ## | [3591] | 60.50463278   | 38.91901594   | 9.21064345    | 126.02266596  | 35.84803224   |
| ## | [3596] | 175.59219030  | 128.21238554  | 107.61134575  | 254.73193090  | 423.83220563  |
| ## | [3601] | -125.24910969 | 15.49803986   | 62.56971541   | -55.00800382  | 314.68780145  |
| ## | [3606] | 323.82633849  | 263.25749781  | 91.29991376   | 264.28699539  | 49.72617786   |
| ## | [3611] | 215.62841185  | 176.05046718  | 393.85873676  | 89.11918492   | 365.17704075  |
| ## | [3616] | 170.21501034  | -73.56159060  | -71.92715537  | 144.34658304  | -39.81854018  |
| ## | [3621] | 142.32820006  | 46.93325188   | 316.18175474  | 206.92813646  | 388.67931258  |
| ## | [3626] | 83.13476888   | 230.92718270  | -131.81769624 | 294.20757170  | 12.17100268   |
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| ## | [3636] | 233.20182294  | -79.64852340  | -212.26905762 | 472.52957852  | 289.90953779  |
| ## | [3641] | 63.03946732   | 395.83319387  | 1.01696247    | -162.25959947 | -8.82402329   |
| ## | [3646] | 327.09153017  | -71.07499451  | 248.70259749  | 63.65301786   | 276.09434880  |
| ## | [3651] | 194.89051667  | 93.87374116   | -217.79617538 | 442.47168620  | 149.14228973  |
| ## | [3656] | 317.12188773  | -128.30852196 | 181.50423050  | 205.48613724  | 369.04177867  |
| ## | [3661] | -297.39326474 | 265.31925566  | 143.66984343  | -204.09793124 | 57.07191294   |
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| ## | [3671] | 515.32376791  | 214.52112091  | 223.16132171  | 353.65588331  | -12.92754044  |
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| ## | [3686] | 77.22021710   | 128.86001181  | 176.03005656  | 182.50300211  | 240.33826450  |
| ## | [3691] | -58.34832397  | -40.18254709  | 401.01044766  | 69.76969544   | -5.36124102   |
| ## | [3696] | 304.46808626  | 190.56211435  | -50.83490710  | -88.54773443  | -135.11351556 |
| ## | [3701] | 286.09039060  | 127.34155673  | 152.79358726  | 172.33311500  | -120.52198301 |
| ## | [3706] | 173.85885941  | 213.88757029  | 144.56946934  | 287.86755606  | 13.02444080   |
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| ## | [3716] | 357.46052989  | -28.52044452  | 122.24879481  | 99.08015274   | 12.12495228   |
| ## | [3721] | 217.29235857  | 246.54137686  | 8.63516654    | 180.61440771  | -84.40202637  |
| ## | [3726] | 76.46588496   | 60.48986166   | -13.30010906  | 254.03647398  | 353.68053133  |
| ## | [3731] | 115.16534910  | 331.78110176  | 286.32618581  | 128.66404066  | 213.30748322  |
| ## | [3736] | 247.87278386  | 15.82419864   | 181.15097058  | 319.94981772  | 396.09095256  |
| ## | [3741] | -91.49972949  | 48.42755289   | -23.70504049  | 133.06793324  | -55.14059309  |
| ## | [3746] | 61.57687903   | 188.53578619  | 473.30930876  | 269.90934962  | -80.32448685  |
| ## | [3751] | 76.59865761   | 160.68922540  | 154.55035939  | 493.68933073  | 95.01423455   |
| ## | [3756] | 350.92194698  | 250.73354747  | -43.76452072  | 8.87216492    | 171.11790150  |
| ## | [3761] | 502.96199449  | 76.55299877   | 220.48276237  | -127.59610830 | 159.82371591  |
| ## | [3766] | 102.56883719  | 43.86816656   | -135.37365940 | 128.52634524  | -26.58699815  |
| ## | [3771] | 40.88715091   | 160.72002187  | 131.53855188  | -18.58628368  | 425.33004448  |
| ## | [3776] | 241.71000363  | -72.93269041  | 70.61396780   | 58.91691669   | 102.40678968  |
| ## | [3781] | 108.01688353  | 218.53734291  | 83.96544843   | 36.50917781   | 250.52919688  |
| ## | [3786] | -26.94181736  | -33.99184498  | 143.64128143  | 121.11366829  | 105.21659878  |
| ## | [3791] | 126.96148556  | 179.45559537  | 467.96031885  | 200.76546097  | 84.79626169   |
| ## | [3796] | -113.87343421 | -20.30621542  | 346.19958526  | 75.34149539   | 13.81578851   |

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| ## | [3801] | 38.85615163   | -36.82586318  | 221.94065793  | 574.69051745  | -227.51709806 |
| ## | [3806] | 349.99999811  | 105.16996419  | 217.45804452  | 20.61819749   | 496.38116213  |
| ## | [3811] | 220.18502664  | 32.86573183   | 359.51410002  | 183.64152032  | 129.54944533  |
| ## | [3816] | -124.85239920 | 231.52995957  | 222.07403354  | 309.87963677  | 28.43814635   |
| ## | [3821] | 278.42222603  | -72.92975240  | 195.57935294  | 129.14701583  | 416.53013853  |
| ## | [3826] | 25.35837952   | 787.42561054  | 276.96442355  | 375.16820670  | 56.37970327   |
| ## | [3831] | 81.17895192   | 106.77486691  | 470.74204881  | 77.43638488   | -216.57018719 |
| ## | [3836] | 84.15361233   | 1.61239825    | 429.44488846  | 326.49808285  | 146.62554650  |
| ## | [3841] | 206.00689357  | -243.39779199 | 73.27003965   | 255.31144775  | 82.05889595   |
| ## | [3846] | 271.91336027  | 108.33745646  | 168.46715075  | -103.69257985 | 15.37439370   |
| ## | [3851] | 282.29904124  | 300.55895500  | 252.42502869  | 107.27052203  | 280.80934387  |
| ## | [3856] | 387.43467545  | 128.92683251  | 179.86200019  | 60.16488657   | 198.47772567  |
| ## | [3861] | 31.87989990   | 137.73586522  | 198.99034403  | -58.76447232  | 65.99126651   |
| ## | [3866] | 502.61411157  | -20.68515368  | 389.65969484  | 98.83446550   | 173.15750025  |
| ## | [3871] | -92.78024932  | 374.04524211  | 114.48764030  | 435.94331797  | 460.92511914  |
| ## | [3876] | 139.49699855  | -184.86194541 | 326.70905652  | 357.95574809  | 517.14830457  |
| ## | [3881] | 540.23122961  | 260.81020847  | 269.46811893  | 572.99263552  | 48.13895124   |
| ## | [3886] | 229.12044991  | 60.80474104   | 225.59952052  | -173.65414741 | 285.20620864  |
| ## | [3891] | 272.93895213  | 286.21308556  | 530.19847183  | 282.38550581  | 238.26129225  |
| ## | [3896] | 281.96478421  | 225.00232659  | 333.68698307  | 201.34894807  | 158.96185647  |
| ## | [3901] | 274.94287636  | -162.66058132 | 61.91910955   | 267.74902511  | 441.30727710  |
| ## | [3906] | -79.29025220  | 356.21266610  | 311.45486012  | 393.77405049  | 298.30959878  |
| ## | [3911] | -30.78022810  | 263.07027131  | 154.69437072  | 110.98387179  | 30.52988914   |
| ## | [3916] | 317.41609703  | 140.14351252  | 174.28419942  | -48.05401280  | 107.05308910  |
| ## | [3921] | 513.17952277  | -200.52546156 | 478.93273186  | 53.99588675   | 209.10001517  |
| ## | [3926] | 16.42960277   | 155.00580257  | -24.15217149  | 36.78358851   | -154.63627508 |
| ## | [3931] | 449.85273230  | 287.64138327  | 59.35375979   | 120.51030605  | 274.55478433  |
| ## | [3936] | -142.42713415 | 264.40739738  | 222.71176661  | 337.08600698  | 18.16385636   |
| ## | [3941] | 191.13264759  | 260.78635841  | 348.61289568  | 88.66500460   | 380.70074291  |
| ## | [3946] | 351.52444084  | 196.72779140  | -115.08368866 | -83.20964934  | 13.08821894   |
| ## | [3951] | 219.61302387  | 254.00385798  | 173.71413949  | 334.71082781  | 274.30533592  |
| ## | [3956] | 328.62430756  | 292.35240670  | 101.39373447  | 206.25125271  | 81.40969421   |
| ## | [3961] | -8.54295219   | 317.16072632  | 25.72565105   | 245.30711843  | 210.17659144  |
| ## | [3966] | 21.47801219   | 272.24614038  | 152.94841532  | 167.81559549  | 50.64069565   |
| ## | [3971] | 138.69616627  | 223.47804278  | 244.07505711  | 51.92119823   | 42.06760486   |
| ## | [3976] | 331.74140784  | 105.37830187  | 184.20592070  | 48.94618183   | 13.78760800   |
| ## | [3981] | 229.05971724  | 85.42995257   | 171.54354009  | 318.95205833  | 232.73203199  |
| ## | [3986] | 119.11818024  | 87.24821706   | 320.65407631  | 409.88003158  | 223.33198105  |
| ## | [3991] | -143.74140257 | 438.85469850  | -15.15905198  | 188.11992384  | 489.91297550  |
| ## | [3996] | 159.54696968  | 279.53388064  | -85.44235318  | 244.88981589  | 139.76694681  |
| ## | [4001] | -221.15926330 | 199.77980791  | -68.61040212  | 135.59251994  | 305.61987853  |
| ## | [4006] | 346.07555524  | 148.15122316  | 138.47686005  | 71.77980767   | 50.41230879   |
| ## | [4011] | 19.21805152   | 18.38820113   | -119.32386107 | 101.52588741  | 157.10684991  |
| ## | [4016] | 255.17495497  | 174.01005163  | 322.95369856  | -109.80343522 | 222.70157427  |
| ## | [4021] | 102.91606455  | 60.78041655   | 172.29983085  | 109.23708045  | 161.80383381  |
| ## | [4026] | 191.40129113  | 91.59328941   | 7.74149971    | 245.68568440  | 255.23387588  |
| ## | [4031] | 210.77009050  | 242.30732513  | 200.02086414  | -10.69006116  | 233.08098491  |
| ## | [4036] | 417.04179883  | 181.84201541  | 4.48091860    | -12.50945545  | 26.87726487   |
| ## | [4041] | 286.17670454  | 90.44047538   | 82.20115646   | 297.28129494  | 120.39524497  |
| ## | [4046] | 269.65750842  | 26.54912406   | 81.95257809   | 457.40066012  | -46.95118030  |
| ## | [4051] | 305.21380453  | 136.74263696  | 235.28617623  | 435.90321312  | 196.86121937  |
| ## | [4056] | 116.63358707  | 28.84781449   | 84.07970644   | 184.12134391  | 143.95216277  |
| ## | [4061] | -57.40262800  | 246.92363839  | 161.33973796  | 158.02064017  | 367.32416206  |
| ## | [4066] | 78.21293239   | 281.49528422  | 275.85979122  | 307.20664255  | 301.03761883  |

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|----|--------|---------------|---------------|--------------|---------------|---------------|
| ## | [4071] | 79.11576139   | 194.77800616  | 195.64409900 | 324.08968560  | 123.84515681  |
| ## | [4076] | 27.11748275   | 311.88134325  | 254.86068206 | 193.32595016  | 47.54910278   |
| ## | [4081] | 248.14609403  | 47.54768176   | 360.86041851 | 380.24067736  | 308.28140118  |
| ## | [4086] | 216.88844937  | 170.27087717  | 59.86624137  | 56.44008663   | 145.78319309  |
| ## | [4091] | 444.74621208  | 376.38286938  | 403.73450564 | 183.69906698  | 135.93123608  |
| ## | [4096] | 133.89035777  | 84.55269048   | 364.08875940 | 94.26089075   | 175.62831689  |
| ## | [4101] | 225.12866642  | 224.55593254  | 206.96419878 | 47.78635524   | 165.58130692  |
| ## | [4106] | -0.16845634   | 105.92841987  | 446.61125798 | 123.27269042  | 19.23712617   |
| ## | [4111] | 134.19107862  | -10.12202434  | 313.52980937 | 207.30418765  | -12.43496559  |
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| ## | [4146] | 227.21984339  | 198.54848052  | 165.63755076 | 267.64247382  | 258.72564349  |
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| ## | [4161] | 29.18463221   | 154.92352262  | 220.10901307 | 13.55414003   | 361.63789370  |
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| ## | [4171] | 107.64134302  | 89.95088212   | 14.24598427  | 184.83311896  | 90.64813069   |
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| ## | [4196] | 132.02535866  | 17.46866759   | 59.73598200  | 58.99200598   | 109.57481128  |
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| ## | [4221] | 73.31607195   | 350.65217703  | 229.12479258 | 345.22542832  | 168.74984802  |
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| ## | [4256] | 129.52218062  | -50.49278896  | 215.85628117 | 118.20314235  | -70.18115185  |
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| ## | [4266] | -45.43833904  | 290.85369715  | 238.11135504 | 322.33289252  | -180.77357573 |
| ## | [4271] | 28.36297495   | 9.76128261    | 182.93661222 | 199.19260232  | 29.58367739   |
| ## | [4276] | 126.43077229  | 220.70451656  | 165.25203124 | 245.10330538  | 287.62924048  |
| ## | [4281] | 153.09679543  | 142.10563524  | 99.91236283  | 75.48611949   | 281.53625607  |
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| ## | [4301] | 17.62711368   | 125.59108774  | 384.51608805 | 186.53163977  | -123.51958442 |
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| ## | [4316] | 93.57398690   | 197.00431479  | 303.89601706 | 48.76521913   | 110.77348534  |
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| ## | [4341] | 189.61630655  | 208.80477225  | 345.19885351  | 248.10781397  | 348.51112076  |
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| ## | [4351] | 151.46896867  | 22.36370157   | 347.36981508  | -35.00244201  | -91.59669819  |
| ## | [4356] | 327.45311543  | 418.45456333  | 245.16922015  | 433.74995825  | 177.71838964  |
| ## | [4361] | 165.28877992  | 54.50623613   | 56.78426682   | 7.43212978    | 587.43617639  |
| ## | [4366] | 270.79500098  | 104.19324590  | 139.94895513  | 270.02332570  | 251.53772708  |
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| ## | [4381] | -120.42795059 | 198.33506548  | 189.26206965  | 135.78330614  | 180.65003009  |
| ## | [4386] | 152.78133418  | 407.74841134  | 26.60458743   | 50.87311896   | 44.03335373   |
| ## | [4391] | 102.14817485  | 96.29123667   | 415.49427454  | -88.81889348  | 86.56813346   |
| ## | [4396] | -242.54274124 | 329.96046621  | 177.44168311  | 65.39851533   | 217.37155853  |
| ## | [4401] | 54.97610342   | 177.86650167  | -8.64668000   | 361.09608471  | 105.93532482  |
| ## | [4406] | 133.31754080  | 247.97102656  | -41.89555336  | -15.25548858  | 476.31970663  |
| ## | [4411] | 296.98938417  | -15.87389371  | 111.41045166  | 275.86576932  | 73.80339161   |
| ## | [4416] | 180.76530660  | 140.94653252  | 255.68955270  | 465.26834529  | 154.08592450  |
| ## | [4421] | 504.61297988  | -221.53336413 | 167.16933802  | 53.49295723   | -292.39613482 |
| ## | [4426] | 169.86055746  | 239.56701966  | 209.73224388  | 304.35657162  | 195.81768254  |
| ## | [4431] | 79.46677083   | 235.79805884  | -31.91127660  | 48.15366350   | -7.83043769   |
| ## | [4436] | 149.27880702  | 250.51655110  | -248.70189767 | 61.22460883   | 61.74338901   |
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| ## | [4451] | 356.11104470  | 323.86378993  | 213.61875542  | 230.85173371  | -50.78884106  |
| ## | [4456] | 248.39055789  | 191.14510411  | 103.23362080  | 96.81932085   | 287.89505186  |
| ## | [4461] | 14.44322924   | 198.29950528  | -49.73706433  | -208.33346147 | 221.73747975  |
| ## | [4466] | 251.82979491  | 136.15074465  | 287.02726255  | 214.75572218  | 175.64732182  |
| ## | [4471] | 92.46531150   | 55.60377524   | 302.71226669  | -80.28064101  | 71.13277081   |
| ## | [4476] | -111.31519189 | 145.76128170  | 273.42055321  | 217.94898293  | 34.21053499   |
| ## | [4481] | 214.71411328  | 273.73630086  | 116.11771661  | 291.30645427  | 105.44410362  |
| ## | [4486] | 30.10306476   | 211.70947075  | -44.37577733  | 53.91506109   | -47.10995485  |
| ## | [4491] | -364.79732195 | 182.64533737  | -58.94741132  | 43.56021557   | 149.12106867  |
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| ## | [4501] | 142.92551915  | 61.27960458   | 195.89648108  | 123.61935020  | 362.87174305  |
| ## | [4506] | 10.36667290   | -114.50539469 | 507.18209098  | -40.18767705  | 183.22475383  |
| ## | [4511] | 69.04317281   | 406.53573475  | 352.96011617  | 18.66493923   | -45.49941022  |
| ## | [4516] | -51.44002375  | 331.65583705  | -120.58471831 | 344.16395769  | 107.21336494  |
| ## | [4521] | 51.24553293   | 181.40472399  | -122.77488218 | 20.86503353   | 171.15937318  |
| ## | [4526] | 97.91218895   | 212.79323804  | 328.68344201  | 339.42566063  | 114.48887091  |
| ## | [4531] | 280.24433926  | 182.54190377  | 249.79121687  | 211.88934396  | 62.69658405   |
| ## | [4536] | 325.93797310  | -31.29913445  | 58.17561855   | 196.40841090  | 354.00293295  |
| ## | [4541] | 163.81313723  | 111.37345471  | -74.36928637  | 237.80377835  | 219.65371760  |
| ## | [4546] | 48.88776766   | -136.62771414 | 49.56253950   | -197.37457572 | 353.89944368  |
| ## | [4551] | -113.81199611 | 86.27822671   | 382.41131025  | 327.73854331  | 109.44817196  |
| ## | [4556] | 96.22124358   | 250.25285422  | 454.41225593  | 285.24504388  | 140.74809378  |
| ## | [4561] | -29.37833856  | 299.99858516  | 367.40609741  | 146.72558311  | -10.37188916  |
| ## | [4566] | -52.96633875  | -152.83139882 | 30.36094206   | 50.25438888   | 85.67349738   |
| ## | [4571] | 20.14410213   | 14.64280554   | 9.75762673    | 341.68370090  | 211.69369342  |
| ## | [4576] | -50.79934790  | 316.92791747  | 184.62940758  | 223.75119901  | 189.45835203  |
| ## | [4581] | 275.91766494  | 109.23097887  | 124.19637303  | 304.76100165  | 403.92676572  |
| ## | [4586] | 158.60485417  | 133.38487563  | 262.04875453  | 368.19009098  | 360.16525651  |
| ## | [4591] | 151.15591635  | -78.31527963  | 631.33032761  | 259.09669661  | 197.57840671  |
| ## | [4596] | 290.37647796  | 270.85346050  | 427.63839608  | -0.72305500   | 94.89768849   |
| ## | [4601] | -8.24449291   | -225.40997544 | 113.96239811  | 88.00155314   | 395.21915896  |
| ## | [4606] | 372.95691532  | 158.71368554  | 125.87403086  | 438.96646003  | 289.07956850  |

|    |        |               |               |               |               |              |
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| ## | [4611] | 391.37399521  | 169.64024468  | 125.04818996  | 130.13650287  | 282.88864992 |
| ## | [4616] | 447.64875819  | 189.79223589  | -28.94619235  | 408.34103074  | 121.88107953 |
| ## | [4621] | 60.63117575   | -88.94368423  | 245.98008839  | -40.61684876  | 222.31994840 |
| ## | [4626] | 80.10184497   | 108.37975039  | 60.20171609   | 182.56534386  | 194.20076192 |
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| ## | [4636] | 29.56183685   | 45.33052634   | 13.16105825   | 186.94807288  | -11.02762809 |
| ## | [4641] | -95.29236694  | 287.99472423  | 38.71261657   | -176.06230076 | 162.34310984 |
| ## | [4646] | -54.24144693  | 195.31940666  | 367.31359402  | -7.01225789   | 250.29892741 |
| ## | [4651] | 417.05943288  | 392.76181342  | 370.30213880  | 199.87778662  | 50.65185360  |
| ## | [4656] | 81.27585032   | 7.64965187    | 164.19729293  | 262.50288621  | 144.38870608 |
| ## | [4661] | 232.01308750  | 144.86096198  | 44.49066230   | 333.12546016  | 201.83812999 |
| ## | [4666] | 158.11585204  | 340.54697804  | 147.91727698  | -31.33307159  | 403.98410080 |
| ## | [4671] | 96.72841998   | -155.94443323 | 165.62455904  | 12.99390036   | 275.55875104 |
| ## | [4676] | 152.83674914  | 115.49772114  | 87.07974380   | 223.07297940  | 67.47098042  |
| ## | [4681] | 285.37002073  | 51.13787291   | 1.77332854    | 75.08652686   | 137.82915200 |
| ## | [4686] | -194.95507220 | -2.06617024   | 280.24276444  | -108.48702219 | 175.11070187 |
| ## | [4691] | 106.15202127  | 393.62996347  | 158.81409673  | 449.09766592  | 93.96697340  |
| ## | [4696] | 322.84620414  | 3.44544630    | 306.32024411  | 44.35195488   | 175.73338321 |
| ## | [4701] | 193.72264874  | 161.13409423  | 186.58092507  | 137.95479074  | 230.58698408 |
| ## | [4706] | 20.13792399   | 495.94617279  | 74.59287107   | 5.15611715    | -92.47809701 |
| ## | [4711] | 397.16955347  | 26.14277893   | -222.80640584 | 238.75322838  | -65.01206771 |
| ## | [4716] | 147.52768839  | 74.07412874   | 11.01566694   | 106.53588155  | 126.18648359 |
| ## | [4721] | 38.22120151   | -244.74931560 | 351.62361561  | 240.33986699  | 96.95394500  |
| ## | [4726] | 358.98996926  | 82.63269383   | -63.31944196  | 141.05911428  | 227.64007208 |
| ## | [4731] | 253.83072046  | 270.34108761  | 88.02314295   | 123.95910332  | 294.75918347 |
| ## | [4736] | 14.12501805   | 353.41495282  | 191.55363546  | 281.30220075  | 212.48822512 |
| ## | [4741] | -40.50367153  | 105.07175613  | 174.54664610  | 354.80467416  | 334.17875035 |
| ## | [4746] | -109.53933786 | 171.90884523  | 269.11868598  | 209.04325860  | 289.38141190 |
| ## | [4751] | -96.26284202  | 382.15985603  | 251.49743775  | 328.90431032  | 302.10729133 |
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| ## | [4766] | 96.27050681   | -81.20766987  | 167.10445331  | -49.34549504  | 152.07506431 |
| ## | [4771] | 373.77732589  | -85.52967192  | -99.79550967  | 322.88556898  | 172.61095304 |
| ## | [4776] | 315.36417377  | 10.63226021   | 95.48161206   | 101.04237939  | 58.05942186  |
| ## | [4781] | 500.54941023  | 84.90072154   | 35.08787585   | 542.63442869  | 92.87059948  |
| ## | [4786] | -101.21550238 | 138.85475784  | 68.43955454   | -19.45570035  | 313.01341451 |
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| ## | [4796] | 80.71347446   | 244.88380313  | 191.19076295  | -34.30001321  | 310.39856169 |
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| ## | [4806] | 390.06789798  | 100.17019793  | 328.58113298  | 281.26762209  | 28.06671359  |
| ## | [4811] | 182.20343227  | 191.38652110  | 189.12358920  | 120.82736474  | 227.39746808 |
| ## | [4816] | 31.45928404   | 203.03777886  | 54.69526396   | 220.63030049  | 91.92390879  |
| ## | [4821] | 520.25962637  | 161.79049937  | 85.29521676   | 279.38093870  | 176.44508292 |
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| ## | [4841] | 196.24645831  | 280.29542462  | 320.49470249  | 457.14760925  | 194.83016910 |
| ## | [4846] | 124.68557358  | 329.98779332  | 165.18695217  | 20.07053191   | 220.24194267 |
| ## | [4851] | 153.27551392  | 80.69807627   | 196.98355061  | 270.86690708  | 747.54862157 |
| ## | [4856] | 33.01579068   | 132.11920200  | -109.45950237 | 11.98650405   | 32.04556885  |
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| ## | [4876] | 297.12441540  | -12.79403069  | 225.66872917  | 323.68257809  | 223.91464078 |



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|----|--------|---------------|---------------|---------------|---------------|---------------|
| ## | [4881] | 256.48166801  | 320.06059259  | 245.83774275  | 245.51240707  | 203.15425231  |
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| ## | [4901] | 17.93297349   | 99.56461023   | 219.20770164  | 202.39147190  | 309.85928489  |
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| ## | [4911] | 19.33923340   | 22.88531779   | -141.28279364 | -85.54120577  | -139.72153917 |
| ## | [4916] | 56.37742136   | 115.22406403  | 442.00866307  | 92.45539264   | 64.64292769   |
| ## | [4921] | 263.63031349  | 127.07802040  | 43.68273414   | 90.41760564   | 212.32270814  |
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| ## | [4936] | -73.20007975  | 482.16524597  | 41.03510529   | 262.04433949  | 64.36335626   |
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| ## | [4956] | 116.09606725  | 162.51649285  | 271.31633720  | 470.46788492  | 101.08327315  |
| ## | [4961] | 142.90318147  | 430.41650587  | 137.92505553  | 341.51011025  | 130.78830059  |
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| ## | [4981] | 144.30000031  | 374.46907186  | 124.99755517  | 285.71004609  | 42.83293680   |
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| ## | [5071] | 198.97373545  | 330.04830029  | 351.31562036  | -12.24767439  | 227.11194025  |
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| ## | [5096] | 13.89574436   | 348.42213187  | 376.32930720  | 181.97535033  | 354.29514246  |
| ## | [5101] | 360.48815203  | 248.16511497  | 220.81243842  | 264.41439132  | 449.36659384  |
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| ## | [5121] | 492.32005239  | 226.76890897  | -57.33663395  | 0.74836945    | 244.70920566  |
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| ## | [5151] | 167.60960702  | 138.84246146  | 174.93902372  | 89.79955409   | -9.63059041   |
| ## | [5156] | -306.33686139 | -63.01563318  | 322.32151849  | -50.87718678  | 241.57197404  |
| ## | [5161] | 165.99875087  | 301.48806612  | 166.38224511  | 94.61296785   | 94.00797150   |
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| ## | [5176] | 400.79511344  | 43.29139261   | 16.22137227   | 65.72237042   | 124.05673171  |
| ## | [5181] | 253.13737369  | 241.63635635  | -41.58683018  | 137.57113793  | 26.56184883   |
| ## | [5186] | 54.80047577   | 213.42308778  | 59.12135473   | -58.12679012  | -44.39338406  |
| ## | [5191] | 221.01754093  | -115.24693920 | 221.90518264  | -188.28341909 | 318.64495458  |
| ## | [5196] | 47.58016195   | 135.31734866  | 283.73775211  | 63.93320176   | 482.15424879  |
| ## | [5201] | 76.15176308   | -50.83060929  | 231.26740748  | -17.92525280  | 134.45583348  |
| ## | [5206] | -237.33876770 | 146.15442089  | -94.09220801  | -41.34328987  | -23.75353144  |
| ## | [5211] | 332.49751857  | 167.68204854  | 310.30502434  | 236.31408613  | 89.77141730   |
| ## | [5216] | 410.83317007  | 186.50020362  | -165.21513696 | 260.07027127  | 333.14381418  |
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| ## | [5236] | 158.76098894  | 356.46600788  | 62.58587090   | 123.60056809  | 21.89722388   |
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| ## | [5246] | 147.37445224  | 245.59726946  | 401.70603170  | 46.46955857   | 251.51095084  |
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| ## | [5261] | -112.35553042 | 205.68115866  | 268.09980698  | 303.43841409  | 77.01439396   |
| ## | [5266] | 132.33576053  | 12.30673535   | 288.18968817  | -47.31520620  | 176.83348541  |
| ## | [5271] | 21.67741736   | 83.57854524   | 264.99469752  | 58.45050894   | 53.60641843   |
| ## | [5276] | 80.29165076   | 147.75771945  | 252.69483912  | 270.66338019  | 326.17414694  |
| ## | [5281] | 198.69361384  | 277.27498375  | 298.67957425  | -42.98447218  | 53.30612998   |
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| ## | [5291] | -90.12342794  | -27.10271307  | 160.53959669  | 393.77751936  | 289.75291935  |
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| ## | [5311] | 336.97734961  | 384.75294317  | 155.89092113  | 347.18374812  | 148.23774486  |
| ## | [5316] | 226.16340034  | 3.42924450    | 95.68713151   | 125.98415198  | 108.29362503  |
| ## | [5321] | 375.84852705  | 79.84270382   | 286.04168652  | 278.24846756  | 7.98032075    |
| ## | [5326] | 90.53168524   | 73.87731830   | 290.08909476  | 93.43399915   | 43.60677968   |
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| ## | [5341] | 150.58620676  | 118.34324978  | 142.56196961  | 182.38047720  | 83.93208018   |
| ## | [5346] | 160.88337379  | 295.54432857  | 53.71219021   | 299.87715352  | 498.89774355  |
| ## | [5351] | 4.87555768    | 250.09626817  | -39.80617272  | 148.40437833  | 236.53463369  |
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| ## | [5361] | 127.62748055  | -7.79105073   | 68.21829799   | 216.91367069  | 276.44911254  |
| ## | [5366] | 275.07261297  | 38.23718997   | 412.21579281  | 282.05472374  | 104.46986073  |
| ## | [5371] | 191.84564582  | 226.46669476  | 280.37157595  | 301.14674112  | 177.01840261  |
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| ## | [5386] | 48.57462899   | 151.63357425  | 69.30550151   | 96.31839550   | 227.81798795  |
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| ## | [5396] | 44.74233462   | 356.84186443  | 244.91895839  | -92.53996161  | 351.98053265  |
| ## | [5401] | -8.22705381   | 65.13670139   | 399.42453562  | 146.43609079  | 34.01229955   |
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| ## | [5411] | 118.17744594  | 160.42844870  | -59.52593053  | 199.03658042  | 172.85801310  |
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| ## | [5421] | 404.63539979  | 35.44589703   | 327.49440602  | 449.68422764  | 27.27248591   |
| ## | [5426] | 221.22904127  | 351.51112434  | 378.32296096  | 88.02187573   | 299.96410151  |
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| ## | [5461] | 181.28442541  | 196.02142204  | 77.76336983   | 155.24469258  | 316.46190776  |
| ## | [5466] | 201.71674801  | 164.02460840  | 10.88133598   | 188.37339623  | -121.90287669 |
| ## | [5471] | -28.65803084  | 89.61065362   | 78.44448526   | -27.51034447  | 433.21268941  |
| ## | [5476] | 357.97573828  | 6.97273107    | 221.46011200  | 465.15228010  | 188.96168332  |
| ## | [5481] | 251.65871536  | 310.30929714  | 408.98383644  | 145.20812731  | 304.83247235  |
| ## | [5486] | 75.15842758   | 290.68943697  | 13.09240495   | 70.89058085   | 438.37914464  |
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| ## | [5506] | -28.19171576  | 99.49595831   | 307.31062359  | 151.37132077  | -87.36885266  |
| ## | [5511] | 374.41185679  | 146.59632659  | 152.58049240  | -33.14569789  | -8.28619782   |
| ## | [5516] | -18.20841019  | 297.08080469  | 261.23726186  | 157.32188516  | -146.26899373 |
| ## | [5521] | 65.67945846   | 298.17556269  | 218.93844826  | 312.40414688  | 281.05364624  |
| ## | [5526] | -13.24979433  | -226.75245977 | -146.94312703 | 186.95233131  | 256.53111944  |
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| ## | [5536] | -153.44138990 | 216.82285930  | 174.46997267  | 156.89966239  | 313.46415248  |
| ## | [5541] | 235.19516483  | 116.21125356  | 156.94529374  | 288.32356547  | -84.70256631  |
| ## | [5546] | 211.73299330  | -117.18518641 | 275.47034093  | 68.24254212   | 263.30739178  |
| ## | [5551] | 141.20850139  | 337.03814622  | 527.61322755  | -72.10297322  | 133.09209851  |
| ## | [5556] | 616.07293931  | 83.99782208   | 84.55270106   | 111.92070767  | 386.49663674  |
| ## | [5561] | -15.34939759  | 35.86886617   | 40.03576649   | 230.97376873  | -32.01365562  |
| ## | [5566] | 331.09592899  | 63.53016377   | -12.68184139  | -20.76779651  | -17.79239025  |
| ## | [5571] | -196.46984106 | 224.16757673  | 146.49951870  | 285.25728313  | 103.18575137  |
| ## | [5576] | 37.89836868   | 260.32307575  | 241.29731108  | 78.23305681   | -119.50279026 |
| ## | [5581] | -83.54880354  | 116.67327051  | 462.81186068  | 189.70945198  | -142.46662912 |
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| ## | [5596] | 218.91577317  | 34.99943801   | 258.24693349  | 123.88940625  | 105.93298087  |
| ## | [5601] | -45.68004457  | 47.43482563   | 467.30164870  | 18.84996321   | 149.98631156  |
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| ## | [5626] | 199.51011135  | 162.45323967  | -120.05344814 | 373.69438219  | 172.20268277  |
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| ## | [5636] | 223.93398739  | 257.95730095  | 211.52071913  | 204.94470317  | 343.64196484  |
| ## | [5641] | 233.54928761  | 177.31355733  | 295.52410771  | 184.59300686  | 44.20496817   |
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| ## | [5666] | 197.59135784  | 280.64421381  | 196.91168768  | 135.81184554  | 131.35737603  |
| ## | [5671] | 69.67527699   | 202.44101897  | 199.10021095  | -105.11554530 | -56.45121834  |
| ## | [5676] | 217.01747982  | 160.85820832  | 436.30816764  | 124.82428098  | -1.62741269   |
| ## | [5681] | 313.67677938  | 416.99757989  | 459.99151224  | 294.48754175  | -7.60800041   |
| ## | [5686] | 7.44807505    | -31.42085086  | 256.78224240  | 129.17244996  | 427.60170750  |

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| ## | [5691] | -10.05610198  | 241.63994876 | 296.04884301  | 290.80452887  | 174.62075481  |
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| ## | [5706] | 84.12418254   | 70.24066565  | 205.93394965  | 38.41310434   | 226.96255459  |
| ## | [5711] | -32.53311317  | 292.15690323 | 253.91305290  | 218.81128880  | 69.43930965   |
| ## | [5716] | 367.01821570  | 356.24798780 | 265.79217257  | 159.90033697  | 506.87237348  |
| ## | [5721] | 67.89325267   | 96.17255037  | -152.26119880 | 294.08054349  | 217.99433300  |
| ## | [5726] | 103.48496935  | 219.43803566 | 263.04656414  | 223.24460741  | 61.89789481   |
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| ## | [5741] | 453.67815138  | 186.25214362 | 40.93213981   | 281.43910118  | 13.02016223   |
| ## | [5746] | 80.50831379   | 150.33242992 | 152.86240919  | 271.62903887  | 19.30037777   |
| ## | [5751] | 206.96748061  | 614.26756342 | 3.97651493    | 269.40800982  | 55.69793040   |
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| ## | [5766] | 36.08899922   | 51.62160129  | 165.30062081  | -47.84238648  | 264.17701409  |
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| ## | [5781] | 60.34191366   | 13.97748883  | 466.66461871  | 160.79278813  | 164.23982134  |
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| ## | [5791] | 124.18597144  | 259.99684609 | -34.61674273  | -192.28782189 | 163.16064395  |
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| ## | [5881] | 190.59972553  | 456.72467268 | 225.77004483  | 495.79094247  | 125.32924146  |
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| ## | [5961] | 151.17038985  | 173.55886311  | 134.94458070  | 199.90040227  | -118.62623151 |
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| ## | [5971] | 113.34837170  | 125.61654439  | 305.56123678  | 263.13575778  | 190.46851351  |
| ## | [5976] | 129.08492778  | 328.74074952  | 140.62903459  | 554.07583306  | 395.43950735  |
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| ## | [6011] | 325.15107724  | 108.02894619  | 181.45604558  | 1.21108601    | -44.40123783  |
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| ## | [6026] | 372.66811426  | 270.64523934  | 53.10829328   | 55.02776494   | 333.95334834  |
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| ## | [6091] | 97.20344568   | 198.01535703  | -60.97946900  | -88.28766847  | 231.23093204  |
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| ## | [6126] | 40.40836840   | 429.69482339  | 228.39939957  | 125.01075484  | -24.21758700  |
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| ## | [6141] | 105.86324317  | 290.98874646  | 505.86143722  | 147.47952019  | 175.38629238  |
| ## | [6146] | 31.77070933   | 145.41590618  | 157.37281009  | 159.17065458  | 35.19400399   |
| ## | [6151] | 24.66823547   | 377.41943484  | -137.63594746 | 122.61734536  | 31.33285002   |
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| ## | [6171] | 157.40840672  | 458.55845228  | 223.53327889  | 19.35074527   | 268.41442079  |
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| ## | [6186] | -21.90321386  | 20.80362612   | 228.80786797  | 148.83758777  | 244.14234757  |
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| ## | [6226] | 176.64547347  | 464.12505145  | 224.03482232  | -47.17353655  | 98.27911009   |

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| ## | [6231] | 381.11958087  | 86.64524843   | 358.03904088  | 94.49872113   | 241.97024360 |
| ## | [6236] | 176.52498029  | 100.92125298  | 38.89521176   | 59.82272661   | 99.14208539  |
| ## | [6241] | 29.72447623   | 282.36681301  | 152.30141478  | 363.02158384  | 186.36125327 |
| ## | [6246] | -28.08673788  | 194.40961912  | 115.39932553  | 256.35305720  | 393.81527202 |
| ## | [6251] | 20.03209061   | 61.84626686   | 16.75365359   | 317.14497126  | 251.20863930 |
| ## | [6256] | 498.10011585  | 325.90283741  | 266.77834081  | 187.18991887  | 415.98616248 |
| ## | [6261] | 383.19402412  | 148.52515585  | -188.49942487 | -61.34109796  | -14.32643403 |
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| ## | [6271] | 283.57883895  | 123.84931008  | 220.52773661  | 243.32974575  | 23.82950781  |
| ## | [6276] | 147.35180588  | -34.88645608  | 171.07382401  | 148.82768757  | 138.34388367 |
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| ## | [6286] | 0.25296538    | 73.44975280   | 59.18548834   | 61.20542371   | 290.98066080 |
| ## | [6291] | 89.69443372   | -59.70571553  | 73.16158315   | 452.58662833  | 269.25500247 |
| ## | [6296] | -88.48542967  | 140.24520348  | 111.10559888  | 246.35215114  | 127.21127320 |
| ## | [6301] | -11.63790283  | 214.36034782  | 436.51245116  | 191.09490182  | 328.33105447 |
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| ## | [6321] | 50.24473159   | 79.12809166   | 84.31170273   | 123.19889711  | 233.22662254 |
| ## | [6326] | 133.98485662  | 81.47832181   | 218.44639579  | -262.72637559 | -21.65322626 |
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| ## | [6341] | 303.39686027  | 273.12905963  | 154.85126360  | 306.53706114  | 53.85343199  |
| ## | [6346] | 82.14515991   | 26.43221757   | 56.53493341   | 311.37101074  | 286.94983948 |
| ## | [6351] | 101.37591941  | 169.85531966  | 489.51825439  | 64.74117498   | 233.13909243 |
| ## | [6356] | 305.48669854  | 21.22504947   | 155.53182001  | 242.32771859  | -84.04984913 |
| ## | [6361] | 239.94916329  | 387.02877452  | 27.40238281   | 186.97898379  | 227.49405648 |
| ## | [6366] | 416.15944104  | 265.28606175  | 347.36400224  | 284.29564637  | 404.47869245 |
| ## | [6371] | 63.44819640   | 564.21950568  | 353.29432526  | 102.67843859  | 282.27948416 |
| ## | [6376] | 260.99221042  | 93.19868096   | 273.47141414  | 19.27656057   | 245.83381498 |
| ## | [6381] | 98.35628627   | 283.60979375  | 250.50969941  | 35.66922398   | -46.93018212 |
| ## | [6386] | -35.21882008  | 289.12846438  | 134.91143130  | 317.13513421  | 92.59587555  |
| ## | [6391] | 317.65357404  | 150.05558951  | 204.00471887  | 18.37268855   | -44.23278416 |
| ## | [6396] | 465.00636654  | 355.18291602  | 371.33286612  | -11.98626594  | 46.66406404  |
| ## | [6401] | -109.77636029 | 369.15914956  | 172.14245599  | 44.25813872   | 299.64181463 |
| ## | [6406] | 43.93246352   | 234.80798431  | -10.44104420  | 181.12631214  | 399.32233893 |
| ## | [6411] | -81.11837353  | 274.49075469  | 477.13384178  | 343.54431239  | 296.55605648 |
| ## | [6416] | 25.92644638   | 46.62624895   | 334.31313954  | 347.87804928  | 55.24605808  |
| ## | [6421] | 94.29761571   | 269.09631542  | 37.46480946   | 517.40646954  | 75.38826684  |
| ## | [6426] | 77.99571915   | 61.87958835   | 96.06391698   | 345.49751910  | 488.43952854 |
| ## | [6431] | 172.45325844  | -126.79694710 | 295.67011004  | 402.06743502  | 351.54357651 |
| ## | [6436] | -21.62260696  | 11.63525817   | 104.06403841  | 50.13348043   | -24.86512473 |
| ## | [6441] | 64.17139923   | 35.85243612   | -202.17386629 | 61.97892296   | 300.12296895 |
| ## | [6446] | 163.17834036  | -89.76776067  | 346.22841554  | -148.72403278 | 46.01861471  |
| ## | [6451] | 306.56515965  | -288.59318597 | 263.16687796  | 289.53587629  | 301.66042887 |
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| ## | [6471] | -91.08961220  | 190.80273726  | 215.73393884  | 220.74871892  | 95.62488631  |
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| ## | [6491] | 30.15953673   | 382.56902695  | 158.09929934  | 16.63122645   | -14.05846303 |
| ## | [6496] | 409.86889485  | 497.85323425  | -111.14142382 | 219.41660803  | 320.43762408 |

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| ## | [6501] | 211.14584447  | 291.72417710  | 306.53475328  | 355.15791108  | 18.19979629   |
| ## | [6506] | 402.35916527  | 275.21867898  | 84.64223258   | 338.07666899  | 79.33531165   |
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| ## | [6556] | 306.39633543  | 365.48814166  | 278.65011315  | 98.88562515   | -27.92772643  |
| ## | [6561] | -10.85571337  | 251.93484627  | 352.03114041  | 73.13161956   | 78.31918170   |
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| ## | [6586] | 297.34419735  | -16.29283551  | 328.99531986  | 159.28036943  | -70.63233073  |
| ## | [6591] | 12.76465121   | 105.39749518  | 39.29849164   | 407.46857824  | 270.43120123  |
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| ## | [6606] | 174.89218440  | 85.39496503   | -104.30283702 | 271.11155123  | 15.58490608   |
| ## | [6611] | 347.68990948  | 369.87696435  | 382.11789790  | 183.77093358  | 392.65132884  |
| ## | [6616] | 40.76818348   | 165.84295634  | -69.84878682  | 201.54859015  | 297.73351774  |
| ## | [6621] | 313.24955367  | 103.86907903  | -219.32115083 | 151.53166987  | 178.96810287  |
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| ## | [6631] | 241.17717121  | 124.37790851  | 413.01311883  | -64.15897428  | -29.82983544  |
| ## | [6636] | 228.81837243  | 334.43318071  | 167.80049531  | 397.93001330  | 178.47679671  |
| ## | [6641] | 162.35986121  | 179.10574095  | -29.47828370  | 275.96008293  | 74.52513496   |
| ## | [6646] | 298.92458293  | 373.87318036  | 285.66391355  | 222.34682551  | 147.88858434  |
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| ## | [6666] | -29.66001769  | 68.21206494   | 404.03562322  | -55.83239089  | 208.36349059  |
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| ## | [6691] | 91.24377935   | 200.79679149  | 23.80877214   | -160.68109477 | 363.98855473  |
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| ## | [6761] | -95.15748512  | 228.60988035  | 71.36589373   | 327.88562426  | 212.19255957  |
| ## | [6766] | 22.28270166   | 113.82532673  | 256.82778671  | -94.90990285  | 113.37881639  |

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| ## | [6776] | 88.90402862   | -147.65469192 | 361.18026124  | 205.38533721  | 279.08020351  |
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| ## | [6786] | -93.73785764  | 232.55008133  | 169.46692101  | -50.35396012  | 233.57197105  |
| ## | [6791] | 144.97025373  | 402.45445839  | 267.89308989  | 39.94879715   | 207.06957516  |
| ## | [6796] | 191.39977492  | 44.46810208   | 226.09695149  | 226.86816063  | 161.60057207  |
| ## | [6801] | 536.91281064  | 267.24099091  | 400.17877683  | 369.46461018  | -44.65631053  |
| ## | [6806] | 313.41870860  | 168.47401966  | 42.40245527   | 115.20859998  | 453.82885537  |
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| ## | [6816] | -42.95695251  | 413.56583183  | 101.81277406  | -60.08146823  | 6.81245429    |
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| ## | [6826] | 331.31216452  | -237.65694103 | -6.63593558   | 111.89943969  | 270.30444198  |
| ## | [6831] | 205.86379860  | 257.43054256  | 6.89447675    | 32.28470972   | -159.99633815 |
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| ## | [6881] | 20.17825304   | -142.80867027 | 318.78908577  | 32.20996664   | 63.13860360   |
| ## | [6886] | 170.07781548  | 267.14537269  | 276.11945402  | -139.79177840 | 376.33965488  |
| ## | [6891] | 221.86955949  | 526.08440066  | 384.65855971  | 275.19877345  | 59.06623411   |
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| ## | [6951] | 393.54042969  | 21.24751687   | 11.24108812   | 117.54776450  | 324.38544789  |
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| ## | [6961] | 171.10545208  | 350.40504902  | 228.37544973  | -226.26275399 | 199.09358098  |
| ## | [6966] | -52.97781240  | 252.68487263  | 289.32652126  | 315.68812343  | -111.26167306 |
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| ## | [6976] | 300.89761896  | 290.10012099  | 107.82520969  | 253.66609952  | 250.46536787  |
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| ## | [7011] | -1.73345257   | 135.21845407  | 159.04403031  | -8.70203470   | 299.38178456  |
| ## | [7016] | 28.65737301   | 305.15346934  | 341.34927496  | -120.14493227 | 189.07049529  |
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| ## | [7041] | -16.99501619  | 359.06766937  | 91.24428812   | 364.96802677  | -43.88399359  |
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| ## | [7051] | 438.45779334  | 71.97624044   | 200.81543637  | 107.93755032  | -202.99828869 |
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| ## | [7081] | 304.64074399  | 309.52481573  | 249.02177750  | 291.13222635  | 52.85487773   |
| ## | [7086] | 206.61258778  | 169.47698261  | 240.00353300  | 197.04624774  | 281.24948169  |
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| ## | [7101] | 291.81759919  | 40.96562958   | 358.46888037  | 79.15857008   | 130.30472195  |
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| ## | [7131] | 460.81393764  | 211.37727926  | 79.10291640   | 471.07941185  | 368.44606696  |
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| ## | [7181] | 173.75110838  | 82.81054820   | 11.05266328   | -75.57321738  | -48.31375877  |
| ## | [7186] | 396.79606061  | 279.91687722  | 223.03845927  | 433.04572708  | 245.76800100  |
| ## | [7191] | 29.94993535   | 374.01996035  | 499.70355887  | 51.62027775   | 43.78287982   |
| ## | [7196] | 341.82075399  | 110.10081043  | 161.75628619  | 346.18785222  | 195.81570335  |
| ## | [7201] | 141.13567538  | 359.08395374  | 47.24441998   | 139.11968402  | 180.59489154  |
| ## | [7206] | 109.77909961  | 57.98022566   | 165.59437779  | -105.12255270 | 35.52463916   |
| ## | [7211] | -89.83515137  | 374.08827502  | 280.47363864  | 33.24514187   | 342.87805796  |
| ## | [7216] | 457.07415011  | 318.69075798  | 354.59388571  | 128.51034151  | 79.37798091   |
| ## | [7221] | 532.21371163  | 79.82480676   | 425.74639907  | 320.12255935  | 143.60047239  |
| ## | [7226] | -21.02626536  | -278.66615118 | 258.73783764  | 44.64620406   | 230.33088442  |
| ## | [7231] | -125.45003236 | 353.19807523  | 365.48045849  | -90.20512702  | 14.47133703   |
| ## | [7236] | -31.57555854  | 511.99897238  | -48.18255458  | 151.51955750  | 282.84745586  |
| ## | [7241] | 106.56658362  | 417.36401326  | 163.62618141  | -54.32835674  | 383.57499801  |
| ## | [7246] | 333.33908866  | 122.57333360  | 64.50190103   | 58.58618910   | 104.92862348  |
| ## | [7251] | 201.86807771  | 262.12831773  | 201.81875543  | 29.99603612   | 111.97113490  |
| ## | [7256] | -13.91380773  | 117.07832783  | 161.05200786  | 205.71602851  | 185.05069385  |
| ## | [7261] | 392.80678381  | 364.09650336  | 120.19521711  | -24.89320192  | -155.04361015 |
| ## | [7266] | 184.59407570  | -84.05032210  | 473.22607776  | 232.02036356  | -110.27005406 |
| ## | [7271] | 197.83521578  | 597.61573453  | 112.78828228  | 277.36352901  | 223.86849858  |
| ## | [7276] | 377.39760969  | 29.80287147   | 323.60278643  | 91.81913583   | 279.54366791  |
| ## | [7281] | 443.73204366  | 412.38499061  | 238.08054184  | 66.01244240   | 34.75076465   |
| ## | [7286] | 126.71151223  | 296.59055147  | 16.70373879   | -43.66771531  | 324.73671195  |
| ## | [7291] | 234.07103996  | 18.51025737   | 224.98195751  | 460.94463372  | 230.40848057  |
| ## | [7296] | 237.17120608  | -198.61601745 | 21.06095942   | 180.81964830  | 181.92198849  |
| ## | [7301] | 160.09418528  | 45.87068703   | 268.12881085  | 525.18449785  | 276.24899999  |
| ## | [7306] | 247.34276154  | 419.39656541  | 215.54721374  | 32.49710600   | 362.70870407  |

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| ## | [7311] | -29.70285208  | 140.81943635 | 233.53564950  | 17.65532706   | -84.76394681  |
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| ## | [7336] | 115.12761513  | 300.64351273 | 285.69735737  | -49.96718755  | 62.74917828   |
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| ## | [7346] | 162.93850222  | 5.06694309   | -302.77168305 | 157.68403418  | 151.71872670  |
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| ## | [7356] | 73.32468836   | 61.37549287  | 155.71891424  | 208.49613014  | 220.64446764  |
| ## | [7361] | 290.45231353  | 150.10356375 | -86.38244664  | 279.18180844  | 353.15641777  |
| ## | [7366] | 139.31681494  | 327.84635682 | 436.23064345  | 402.40535170  | 47.62878765   |
| ## | [7371] | -55.19607003  | 155.10051543 | 241.85161663  | 86.37387962   | 37.75142629   |
| ## | [7376] | -160.38909011 | 293.09929080 | 77.80325772   | 88.53532978   | 23.99461395   |
| ## | [7381] | 108.21408084  | 318.46816508 | 63.83076539   | 253.18964444  | 289.59653059  |
| ## | [7386] | 195.75286745  | 97.36840538  | 338.64167244  | 83.83142450   | 10.30568239   |
| ## | [7391] | 241.50232860  | 85.70004603  | 506.61605708  | 106.83828861  | 110.22726860  |
| ## | [7396] | 45.01386709   | 154.02242952 | -62.64100842  | -54.65418387  | -62.56182782  |
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| ## | [7421] | -54.43657164  | -32.88216813 | 84.62146007   | 196.48454904  | 276.26946447  |
| ## | [7426] | -93.01444246  | 135.18169093 | 16.31061159   | 79.08878566   | -67.28232867  |
| ## | [7431] | 99.55086249   | 246.87567094 | 192.93795002  | 219.40612596  | 59.04162833   |
| ## | [7436] | 61.59997723   | 145.30992686 | 188.87688687  | 302.82238625  | 242.02655353  |
| ## | [7441] | 323.98760007  | 226.81417071 | 90.25247735   | 105.85060374  | 421.77817346  |
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| ## | [7456] | -79.85550563  | 201.82245736 | -64.34791741  | 227.03787634  | 221.04652454  |
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| ## | [7466] | 164.16148949  | 148.96637208 | 298.85439321  | -58.92299802  | 141.88350669  |
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| ## | [7476] | -407.34137537 | 144.93883230 | 372.38748469  | 90.16796407   | 47.44312517   |
| ## | [7481] | 148.22624464  | 175.67036211 | -129.14472785 | 146.72892952  | 694.11373482  |
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| ## | [7501] | 202.53555471  | 294.48503594 | 0.29062692    | 412.14249931  | 96.13772837   |
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| ## | [7511] | 36.03357033   | 263.18356552 | 189.40240185  | 103.97476729  | 248.60826836  |
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| ## | [7531] | 437.98457292  | 294.32337565 | 160.24821737  | -27.64231380  | 106.12866314  |
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| ## | [7541] | -91.90093219  | 344.33037458 | 85.18453692   | 274.40335883  | 2.04668220    |
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| ## | [7581] | 184.34342871  | 720.32737383  | -5.97121382   | -17.39510659 | -36.95603793  |
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| ## | [7596] | 226.40507212  | 49.26588250   | 210.76218461  | 204.39328560 | 507.75666284  |
| ## | [7601] | 266.98571256  | 308.36033065  | 196.69774829  | 290.71233176 | -108.86273428 |
| ## | [7606] | 31.73228408   | 236.86793046  | 300.70463609  | 243.42263207 | 290.04873395  |
| ## | [7611] | 254.14943621  | 455.50259305  | -168.08084680 | 143.30120823 | 336.44934886  |
| ## | [7616] | 126.45411184  | -62.24290966  | 323.47836392  | -3.51543667  | 426.67614646  |
| ## | [7621] | 231.24098075  | 15.90031551   | 109.50716062  | 285.92639482 | 268.08675814  |
| ## | [7626] | 53.20256966   | 376.04700055  | 26.59677837   | 136.26596360 | 219.17724388  |
| ## | [7631] | -3.23915331   | 236.87778954  | -216.44058951 | 156.48264242 | 146.47563266  |
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| ## | [7641] | 157.18955651  | 105.63649704  | 489.91074538  | 281.53712667 | 143.97266558  |
| ## | [7646] | 191.53968269  | 96.12435893   | 343.25616842  | 118.62827750 | 106.68912118  |
| ## | [7651] | 281.33260797  | 202.67561400  | 129.11513672  | 262.70362552 | 199.38042315  |
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| ## | [7661] | 158.63174125  | 117.56343295  | 264.01741740  | 280.27580515 | 34.71793327   |
| ## | [7666] | 270.67826427  | 1.33175419    | -19.94561461  | 62.03947326  | 330.16250023  |
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| ## | [7681] | 114.97797382  | 446.82463650  | 402.87488034  | 49.49223027  | 398.08693267  |
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| ## | [7691] | 2.84468412    | 98.84366024   | 91.87736477   | 430.50410543 | 106.57595028  |
| ## | [7696] | 13.58576463   | 52.14390812   | 242.59702703  | 141.38859058 | 104.25035970  |
| ## | [7701] | -45.09259985  | 194.69639879  | 142.30823469  | 183.89360871 | 154.72535633  |
| ## | [7706] | 138.37619498  | 337.48101918  | 218.31213750  | 208.65743732 | 310.13894981  |
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| ## | [7736] | 192.05972718  | 110.94731108  | 297.34686744  | 36.96882735  | -58.59126886  |
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| ## | [7746] | 88.23560865   | 95.62841328   | 247.93820008  | 174.61436287 | 119.72549416  |
| ## | [7751] | 358.99947775  | 284.67460264  | 224.36952859  | 100.99474486 | 88.43299246   |
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| ## | [7771] | 280.24247219  | 329.78568185  | 373.05773416  | 388.90865527 | 376.40244192  |
| ## | [7776] | 22.15401734   | 76.90748658   | 134.66669484  | 343.60952225 | 317.89403559  |
| ## | [7781] | 54.80988133   | 165.63582901  | -106.99544821 | 220.08779499 | 152.57212223  |
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| ## | [7806] | 151.79496585  | 3.97522870    | 195.98445967  | 282.84723615 | 234.78344421  |
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| ## | [7831] | 30.40125496   | 395.92058437  | 44.50087929   | 422.93214013 | -11.77010785  |
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| ## | [7846] | 205.26744082  | 303.15204920  | 264.95164063  | 174.77564724 | 15.39523799   |

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| ## | [7851] | 45.58926571   | 85.82940582  | 358.47010532  | 299.00064167  | 221.31519215  |
| ## | [7856] | 152.62998658  | 6.90319499   | -14.50723526  | 66.91328014   | 261.20519534  |
| ## | [7861] | -37.95133931  | 130.52893935 | 127.20980769  | 210.85181585  | -49.81553625  |
| ## | [7866] | -64.96061496  | 283.59724487 | 258.77981982  | 142.02633561  | 151.07466995  |
| ## | [7871] | 194.64452839  | 167.67126029 | 188.00645939  | -57.77803540  | 27.65232739   |
| ## | [7876] | 5.03952177    | 213.66233446 | 66.29284734   | 125.20143073  | 440.98699717  |
| ## | [7881] | 250.37024253  | 294.37873423 | 119.77305960  | 269.77841051  | 415.53557434  |
| ## | [7886] | 173.49427322  | -19.68262883 | 206.54613303  | 118.10824437  | 109.94877354  |
| ## | [7891] | -277.83758573 | -89.82338474 | 5.00536168    | -102.46034276 | 219.55598863  |
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| ## | [7906] | 61.47353733   | 273.21332830 | 353.82040605  | 411.98060561  | -7.83292966   |
| ## | [7911] | -18.18142413  | 517.48030024 | 28.42235370   | -10.25829755  | 143.58423645  |
| ## | [7916] | 586.89156526  | 158.46189219 | 329.73331284  | 143.96907783  | 206.05795539  |
| ## | [7921] | 39.32455390   | 189.64125077 | 155.79936486  | -150.62282090 | 418.37700771  |
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| ## | [7936] | 287.49889673  | 66.28132770  | -148.74565343 | 249.39091203  | -27.05170600  |
| ## | [7941] | 75.76136187   | 364.35263075 | 122.19636256  | 259.60585035  | -104.76657718 |
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| ## | [7961] | 4.80848511    | 328.27607016 | 386.45852480  | 52.58298177   | 411.72218659  |
| ## | [7966] | 293.49734160  | 152.84920123 | 144.71116407  | 323.89708006  | 10.06555451   |
| ## | [7971] | 200.77256005  | 335.20558603 | 221.34987868  | 122.70081617  | 205.02123977  |
| ## | [7976] | 108.15920017  | -14.26526802 | 158.23027847  | 276.52815413  | 174.37439980  |
| ## | [7981] | 144.91669745  | 169.60839001 | -19.18257019  | 395.34294801  | 234.27265773  |
| ## | [7986] | 246.13303981  | 448.91553426 | 355.76607601  | 305.90546758  | 153.71913884  |
| ## | [7991] | 95.56739249   | 345.17657280 | -80.87007246  | 275.96398579  | 314.49447752  |
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| ## | [8001] | 72.38371827   | 222.97523692 | -151.70879015 | 706.59237028  | 240.75963442  |
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| ## | [8016] | 274.36483569  | 118.03358367 | 80.71710264   | 167.08061223  | 10.49726269   |
| ## | [8021] | 260.59292958  | -22.34821614 | 140.68515155  | 238.22520279  | 91.23687505   |
| ## | [8026] | 327.94600730  | 252.53572121 | 27.53916940   | 87.33893563   | 492.20035720  |
| ## | [8031] | 414.77933443  | 527.46695809 | 534.00976730  | 310.54676151  | 110.39968244  |
| ## | [8036] | -210.44725289 | 221.45947907 | -63.40261679  | 121.32155428  | 57.70828878   |
| ## | [8041] | -18.45747413  | 333.82244570 | 97.56795376   | 4.09900251    | 64.35249669   |
| ## | [8046] | 110.27597261  | 228.80491941 | 26.43824813   | 177.00674709  | 145.46504569  |
| ## | [8051] | 96.90110967   | 66.33566875  | -93.04294813  | 118.32821964  | 159.71207324  |
| ## | [8056] | 251.74464462  | 43.79253564  | 69.24746524   | 80.04891773   | -122.68455240 |
| ## | [8061] | 130.45826681  | 243.98275930 | -146.38408649 | 305.93397866  | 533.39373473  |
| ## | [8066] | 137.41918136  | 0.61536267   | 234.50625817  | -28.51057294  | 395.27872797  |
| ## | [8071] | 84.69120927   | 206.93443739 | 223.29743030  | 390.48009214  | 345.36179151  |
| ## | [8076] | 5.40637632    | 57.06888720  | -191.75188217 | 397.41621146  | 119.07370715  |
| ## | [8081] | 178.24240523  | 192.83256503 | 399.76689402  | 112.05470363  | 100.33989597  |
| ## | [8086] | -74.31390695  | 215.25392569 | 164.35475812  | 202.61953625  | -173.58492471 |
| ## | [8091] | 358.37532038  | -18.18438833 | -117.68510131 | 221.90435374  | 30.74987944   |
| ## | [8096] | 433.90311671  | 101.99438615 | -21.08738267  | 18.48769530   | 195.30612555  |
| ## | [8101] | 360.67558927  | 135.95562147 | 21.40873796   | 92.95324988   | 246.47753935  |
| ## | [8106] | 68.87841542   | 148.72745737 | 207.72118343  | -12.88761453  | 215.87989494  |
| ## | [8111] | 125.69735364  | 195.26833931 | 44.58753538   | 133.38739418  | 68.47930078   |
| ## | [8116] | -3.86919887   | 194.99563093 | 109.23747066  | -244.15677091 | 251.12354004  |

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| ## | [8121] | 55.90433168   | 164.66333194  | 242.25838081  | 1.16621718    | -124.40977671 |
| ## | [8126] | 51.40837522   | 241.37086418  | 92.84847717   | -9.99385423   | 326.37680735  |
| ## | [8131] | 139.49049410  | 440.68556471  | 280.78497582  | 46.62620876   | 190.79492119  |
| ## | [8136] | -97.47594104  | 435.05221273  | 130.05497785  | 162.26752507  | 78.13609830   |
| ## | [8141] | 122.34351983  | -12.52463061  | 96.88091112   | 220.53621894  | 111.12932979  |
| ## | [8146] | 249.31948135  | -62.96517211  | 429.58045238  | -12.98643841  | 48.14127916   |
| ## | [8151] | 43.85509562   | -82.78684849  | 50.02464293   | 342.14537946  | 27.49493417   |
| ## | [8156] | -122.27969848 | 96.85491173   | 268.83043511  | 427.95414226  | -99.54325036  |
| ## | [8161] | -22.28835586  | 55.51670060   | 361.57266473  | -105.26622032 | 127.17583215  |
| ## | [8166] | 235.39737546  | 180.30889691  | 284.28696502  | 234.20265120  | 339.49703259  |
| ## | [8171] | 206.04074166  | 9.12138135    | -52.20566760  | 27.02563524   | 299.30403922  |
| ## | [8176] | 515.24934215  | 77.13212007   | 188.16918539  | 147.29689194  | 234.31324563  |
| ## | [8181] | -36.61354148  | 27.66167954   | 89.17599383   | 250.15058903  | 647.23129649  |
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| ## | [8201] | 367.42888578  | 143.02461268  | -126.23282047 | 369.01661773  | 202.87317833  |
| ## | [8206] | 167.38378414  | 301.06475814  | -83.43602165  | -11.85494098  | 285.45577770  |
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| ## | [8221] | 246.30486462  | 306.30752283  | 295.98514812  | 346.82565028  | 299.60812362  |
| ## | [8226] | -254.14780849 | 61.73717382   | 278.31929423  | 170.51771519  | 33.64915693   |
| ## | [8231] | 98.86124906   | 73.21182329   | 80.00883909   | 559.98482383  | 215.32668014  |
| ## | [8236] | 81.60791067   | 327.22390422  | 64.44014968   | 221.65058053  | -76.53989152  |
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| ## | [8261] | 9.45272438    | 159.62649820  | 111.79184890  | 120.99127765  | 219.69690155  |
| ## | [8266] | 349.76858270  | 136.28243908  | 126.54338208  | 427.85966084  | 16.36930321   |
| ## | [8271] | 89.47722454   | 231.49577150  | 341.65136805  | 136.61369706  | 97.54703874   |
| ## | [8276] | 256.24197449  | 436.64519804  | 181.20564829  | 184.23484810  | -70.40293603  |
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| ## | [8286] | 117.40008200  | 221.16849877  | -4.28063207   | 73.12494279   | -76.88656678  |
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| ## | [8311] | 387.39342871  | 233.20348277  | 46.56746211   | 114.20992663  | -160.62009490 |
| ## | [8316] | 304.22322187  | 480.39679758  | 194.88890760  | -189.98483733 | -90.80257882  |
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| ## | [8331] | 398.27885406  | -62.01919345  | 386.17334309  | -30.60384669  | 259.19864815  |
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| ## | [8381] | 26.20338310   | 329.46339402  | 127.83279157  | 30.52244547   | 347.76433948  |
| ## | [8386] | 235.56858060  | 196.93799508  | -99.76258683  | 49.51694965   | 81.54617174   |

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| ## | [8391] | -244.59686905 | -311.12042685 | 188.53383786  | 74.69419427   | 372.47885241  |
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| ## | [8421] | 139.39195516  | 127.65610755  | 216.97378268  | 282.34245022  | -67.20850445  |
| ## | [8426] | 225.19147293  | 207.69772925  | 21.73180894   | 16.06048498   | 519.22534548  |
| ## | [8431] | 174.92313391  | 18.24980266   | 274.26149435  | 307.63548395  | 253.91397558  |
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| ## | [8451] | 118.75842494  | 171.39352942  | 235.40480766  | 92.82733752   | 323.68023929  |
| ## | [8456] | -60.52928483  | 92.39697456   | 281.71547986  | 1.15654573    | 352.09059030  |
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| ## | [8501] | 91.89436941   | 180.01400809  | 17.98072167   | -139.70861574 | 231.56981662  |
| ## | [8506] | 384.99505805  | 209.05200053  | 243.85432826  | 211.60254329  | 219.52085130  |
| ## | [8511] | 69.48324153   | 70.15885350   | -53.76850366  | 11.95221129   | 216.99296082  |
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| ## | [8531] | 59.61432915   | 92.81160923   | 46.52904820   | 214.30719484  | -232.85078477 |
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| ## | [8556] | 316.60926518  | 257.49041709  | 407.81581428  | 96.02534372   | 339.86804216  |
| ## | [8561] | 285.41029665  | 552.40571562  | -32.87047996  | 42.34468588   | 319.28897828  |
| ## | [8566] | -18.04805341  | -28.28420722  | 391.84595404  | 48.21865155   | 34.60472703   |
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| ## | [8581] | 205.08659607  | 132.67907370  | 374.29337256  | 317.43275087  | 265.44950497  |
| ## | [8586] | 127.97361514  | 225.36769331  | 129.45116512  | 154.97231997  | 102.15996067  |
| ## | [8591] | 334.55683380  | 104.14667417  | 128.67145869  | 338.79223344  | 3.76505820    |
| ## | [8596] | 212.49918801  | 202.68935293  | 196.37640815  | 341.32872463  | 301.23026798  |
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| ## | [8626] | 355.45028333  | 150.42787878  | 323.02184476  | 365.80801606  | 357.41666990  |
| ## | [8631] | 163.24264376  | 99.97312823   | 110.16437557  | 36.74093520   | 181.24173273  |
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| ## | [8661] | 372.72791451  | 106.03832164  | -95.57208429  | 167.79500590  | 132.37079352  |
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| ## | [8671] | 162.53356064  | 278.27067815  | 120.74616084  | 59.26757312   | -79.83229502  |
| ## | [8676] | 154.16114921  | 97.82558284   | -1.81413944   | 477.25282974  | -182.59521324 |
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| ## | [8691] | 49.96259853   | 388.58559260  | 92.74366045   | 135.62659711  | -37.56543957  |
| ## | [8696] | 177.55808543  | 300.78624657  | 168.17224114  | 397.18555059  | -124.09511879 |
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| ## | [8706] | -161.57305239 | 233.71116912  | 134.84647483  | 244.51214445  | 92.27024259   |
| ## | [8711] | 267.90270886  | 14.40264438   | 199.55731911  | 112.98835730  | 2.16627018    |
| ## | [8716] | -6.67822104   | 43.97511644   | 214.84497723  | 16.62405130   | 313.73531708  |
| ## | [8721] | 323.01644809  | 70.04236885   | 163.26800426  | 164.53501311  | 238.96144778  |
| ## | [8726] | 160.58073682  | 96.53562224   | -4.68596814   | 246.55394979  | 375.22052985  |
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| ## | [8751] | 14.16863152   | 109.62646159  | 204.27962349  | 254.57304650  | 268.20166421  |
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| ## | [8771] | 279.06514222  | 347.31402660  | 312.11485089  | -79.42510901  | 248.79597527  |
| ## | [8776] | 414.22056917  | 30.18835217   | 346.79195533  | 212.62672595  | 39.11967196   |
| ## | [8781] | 164.97706195  | 111.22951608  | 163.98394287  | 67.65276452   | 408.40003122  |
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| ## | [8801] | 459.63322139  | 129.52698993  | 241.09155776  | 235.20837936  | 35.70495323   |
| ## | [8806] | 62.71728952   | -12.72304064  | -5.19069778   | 510.13887865  | 385.88089592  |
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| ## | [8826] | 311.81405621  | 263.11819204  | -199.85684331 | 139.97267396  | 114.87261299  |
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| ## | [8836] | 95.67867821   | 231.86645685  | 138.79079653  | 170.90910683  | 64.66683604   |
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| ## | [8846] | 3.66874953    | -107.80897532 | 166.76834805  | 420.45091383  | 53.02236435   |
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| ## | [8856] | 374.23847922  | 192.62280005  | 373.71046058  | 281.40602791  | 407.35670197  |
| ## | [8861] | 287.62556851  | 358.91370358  | -41.48334510  | -40.30229251  | 66.23938803   |
| ## | [8866] | 14.41613963   | 99.08574106   | 61.46179309   | 126.22644514  | 291.76696937  |
| ## | [8871] | 390.73083175  | 100.22441422  | 362.55128413  | 256.09977639  | 110.81126555  |
| ## | [8876] | -111.85695811 | 202.08091620  | 205.83610557  | -288.98328670 | 26.00583221   |
| ## | [8881] | 126.16458094  | 99.71461794   | 3.99518523    | -75.87785596  | 118.14600082  |
| ## | [8886] | 84.90321091   | -18.39217423  | 44.13731429   | 329.06583002  | 80.33660273   |
| ## | [8891] | 314.01646438  | 45.95755763   | 244.87295201  | 292.11204199  | -65.17406302  |
| ## | [8896] | 144.04579269  | 25.35934903   | 357.54457712  | 122.32361281  | 281.41669008  |
| ## | [8901] | 82.18906535   | 206.81306357  | 235.36875300  | 127.62892039  | 136.93834207  |
| ## | [8906] | 196.53600768  | 87.40370721   | 14.49520478   | 334.42731131  | 294.86862823  |
| ## | [8911] | 224.12505355  | 276.38693250  | 106.26373100  | 96.50716490   | 84.62443369   |
| ## | [8916] | 67.19000657   | 75.00463696   | 150.06051047  | 269.58259951  | -70.37110935  |
| ## | [8921] | 237.75138250  | 313.69612008  | 44.52968959   | 223.31053894  | -184.70526005 |
| ## | [8926] | 332.27605778  | 85.17144384   | 29.30174068   | 377.51491432  | 410.99218224  |

|    |        |               |               |               |               |               |
|----|--------|---------------|---------------|---------------|---------------|---------------|
| ## | [8931] | 323.79209868  | 218.72714332  | 23.20729320   | 25.96809851   | 48.87041959   |
| ## | [8936] | 299.48938649  | 12.85300075   | 219.33626191  | 453.01267936  | 237.56225378  |
| ## | [8941] | 147.29936583  | 120.70071097  | 240.12247695  | 23.92614294   | 29.61416296   |
| ## | [8946] | -21.76743494  | 324.84647851  | -9.60853003   | 104.94929072  | 210.81660697  |
| ## | [8951] | 262.60279836  | 215.35000636  | 176.95065134  | -94.77568904  | 117.59738158  |
| ## | [8956] | 122.31963867  | 286.69926713  | 64.31450798   | 161.05435805  | 282.42943069  |
| ## | [8961] | 93.73435869   | -7.78844151   | -148.26574191 | 24.87525910   | 184.42145917  |
| ## | [8966] | 211.98460578  | 144.80589807  | 286.56533066  | 259.96993322  | -115.21926744 |
| ## | [8971] | 96.85185863   | -79.52185347  | 298.18735022  | -211.51963799 | 89.96717713   |
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| ## | [8981] | 206.71516082  | -27.58481761  | 320.32930170  | 101.43817786  | 275.66100103  |
| ## | [8986] | 197.16907561  | 300.08654132  | 160.73740452  | 197.19116338  | 128.11751586  |
| ## | [8991] | -26.32584218  | 119.63691022  | -63.13559449  | 223.35086925  | 255.69185030  |
| ## | [8996] | 415.11133862  | 53.38891454   | 126.98208976  | -53.49459291  | 185.12028270  |
| ## | [9001] | 118.97770762  | 178.16497434  | 574.93056331  | 300.88757632  | 22.96424282   |
| ## | [9006] | 112.18523852  | 208.55927260  | 156.09961629  | 303.23755337  | 40.42673052   |
| ## | [9011] | -11.17884428  | 183.94910385  | 212.17721630  | -39.49198908  | 539.01694099  |
| ## | [9016] | 61.52427726   | 354.36599170  | 204.76654688  | 127.38856888  | 323.48375783  |
| ## | [9021] | 634.32461394  | 183.43296336  | 257.56921697  | -0.38223878   | 241.64041200  |
| ## | [9026] | 97.14953936   | 451.69287658  | -159.71919020 | -244.76810710 | 259.44439976  |
| ## | [9031] | 96.69063728   | 202.53357837  | 360.70041810  | 241.22676750  | 54.53838845   |
| ## | [9036] | -82.64447338  | 369.36147857  | -179.46670327 | 238.73555214  | 226.67951588  |
| ## | [9041] | -65.80107769  | 7.48745162    | 15.59849914   | 44.75498661   | 281.53939841  |
| ## | [9046] | 263.33252224  | 184.39000338  | 95.06613777   | 356.05151472  | 408.35288176  |
| ## | [9051] | 134.25141215  | 281.96727264  | 341.81437298  | -31.35651807  | 333.12579385  |
| ## | [9056] | 291.54561891  | 229.35964317  | 151.25827104  | 289.49572529  | 172.40395946  |
| ## | [9061] | -59.97469036  | 339.58579434  | 116.33299174  | -36.01548859  | 457.38861798  |
| ## | [9066] | 44.37790406   | -41.70265776  | 182.01282334  | -4.22872372   | -77.91796370  |
| ## | [9071] | 341.19937327  | -115.05055975 | 134.29121539  | 301.92279949  | -174.34846263 |
| ## | [9076] | 261.76633119  | 115.52212927  | 124.92868342  | -24.06460060  | 57.99866209   |
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| ## | [9086] | -122.76291723 | 224.34502982  | 171.35035890  | 13.88741606   | 347.35478267  |
| ## | [9091] | 290.17974640  | 244.22120259  | 329.50382094  | 389.21970885  | 67.83396784   |
| ## | [9096] | 183.68337263  | 167.31441320  | 95.21200602   | 134.13035389  | 18.63431790   |
| ## | [9101] | 113.81820428  | 66.78644028   | 288.84008160  | -315.29146075 | 260.48106557  |
| ## | [9106] | -40.52011267  | 87.91971250   | 98.81345029   | 543.41438189  | 29.32648347   |
| ## | [9111] | 43.23275433   | 253.17847338  | 167.14437387  | -119.90990314 | 8.13494675    |
| ## | [9116] | -179.62394512 | 215.06316339  | 343.65990512  | 94.07239733   | 11.21609480   |
| ## | [9121] | -73.83933444  | 355.26286921  | 51.29169006   | 107.84475305  | -76.99896790  |
| ## | [9126] | 132.42484050  | -185.87416636 | 239.80796641  | -86.61729583  | 88.52771770   |
| ## | [9131] | 328.61570707  | 338.02847624  | 248.12165296  | 217.41107279  | 387.15493917  |
| ## | [9136] | 342.16994013  | 12.40247438   | 145.97589186  | 176.12970324  | 52.03993281   |
| ## | [9141] | 361.70555135  | 27.74592111   | 2.28814119    | 449.95335196  | 312.07327274  |
| ## | [9146] | -13.61478728  | -134.86723218 | 75.49370035   | 17.96271892   | 184.79612450  |
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| ## | [9156] | -49.74379863  | 24.48348928   | 168.26590675  | 322.72585518  | 49.79847495   |
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| ## | [9166] | 156.63538785  | 78.65171173   | -9.80650647   | 187.41847832  | 477.67199227  |
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| ## | [9176] | 340.67615549  | 319.78904220  | 254.92067751  | 200.28149350  | 247.65806300  |
| ## | [9181] | 390.68557081  | 113.51759978  | 95.91419610   | 62.82636551   | 147.05639429  |
| ## | [9186] | 189.03027007  | 77.60352381   | 124.00194705  | 358.45281004  | 57.48758263   |
| ## | [9191] | 55.53847484   | 288.16927213  | 321.90036428  | 57.19207649   | -38.65909734  |
| ## | [9196] | 174.25860839  | 28.67205642   | -4.78608823   | 318.51986206  | 367.35947541  |



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| ## | [9201] | 435.54628648  | -255.39585420 | 136.35891495  | 378.11200838  | 103.96756480  |
| ## | [9206] | -96.91105023  | 334.57920775  | 196.39483705  | 308.63357019  | 269.78359392  |
| ## | [9211] | 87.82398801   | 358.18404818  | 174.45718450  | 232.64938296  | 428.89850478  |
| ## | [9216] | -81.80768375  | 78.54346298   | 268.22588414  | 72.42477124   | -121.23165641 |
| ## | [9221] | -38.97223345  | 313.90749479  | 137.56004568  | 165.78974314  | 197.36258800  |
| ## | [9226] | 428.06171563  | 81.35718999   | 155.89704699  | 345.61755800  | 236.92087416  |
| ## | [9231] | 22.71365144   | -94.28917897  | 273.04257465  | 138.55452795  | 264.96824884  |
| ## | [9236] | -9.33958930   | 391.77676716  | 198.84446372  | 309.17691415  | 65.07658987   |
| ## | [9241] | -104.37000441 | 201.28918080  | -112.14564238 | 84.48634690   | 470.22213972  |
| ## | [9246] | 139.20262164  | 165.12188964  | 383.84723127  | 144.77251153  | 278.08668619  |
| ## | [9251] | 136.67980543  | 262.85581187  | 165.77342039  | 326.46626232  | -66.52042822  |
| ## | [9256] | 259.19139252  | 81.58491157   | 12.61100142   | 193.22819505  | 9.68372379    |
| ## | [9261] | 51.06372432   | 269.46376261  | -45.95494835  | 319.15971780  | 192.06810712  |
| ## | [9266] | 269.72291868  | 157.45695903  | 19.69654062   | 15.88074014   | 138.65477468  |
| ## | [9271] | -40.14947714  | 125.63779370  | 124.13273424  | 537.79631207  | 173.48885061  |
| ## | [9276] | -104.75791708 | 170.25606654  | 210.97058937  | 46.33678204   | 107.09637389  |
| ## | [9281] | -29.03034497  | 293.23671279  | 306.57791951  | 86.06430780   | 248.68413665  |
| ## | [9286] | 234.59026594  | 166.51996409  | 383.41197672  | 106.76576096  | 96.36669306   |
| ## | [9291] | -149.58221212 | 106.16087308  | 201.64473412  | 61.65986536   | -81.30479557  |
| ## | [9296] | 84.60325820   | 201.16657533  | 52.26236353   | -11.17098854  | 383.74287459  |
| ## | [9301] | 261.92852525  | 323.44316784  | 70.51503616   | 187.94520071  | 344.82772533  |
| ## | [9306] | 73.50397545   | -124.39598499 | 36.58543227   | 247.25025602  | 224.71174440  |
| ## | [9311] | 164.75979266  | 183.30535574  | 387.21048778  | -30.81876660  | 429.90979235  |
| ## | [9316] | 240.01797736  | -17.68697990  | -40.81126834  | 182.13694146  | 82.33808000   |
| ## | [9321] | 243.03729120  | 361.95222831  | 254.78701008  | -140.14569263 | -214.08185533 |
| ## | [9326] | 404.70515466  | -20.49213555  | 128.33841893  | 158.86344414  | 111.55536281  |
| ## | [9331] | 256.43151968  | -19.81685687  | 13.14216761   | 303.39330288  | -57.45191031  |
| ## | [9336] | 97.01177413   | 157.29688361  | 168.21821300  | 271.91316326  | 463.95442641  |
| ## | [9341] | 243.59976653  | 93.92450030   | 188.54245073  | 23.76863346   | 95.82665407   |
| ## | [9346] | 146.81885071  | 134.91904924  | 232.58569392  | 129.96475504  | 293.97276578  |
| ## | [9351] | 526.85404509  | 193.15303975  | 28.91318110   | -41.73579680  | 356.29065984  |
| ## | [9356] | 68.99209863   | 109.56154902  | 249.65710963  | 133.88346431  | 179.43005556  |
| ## | [9361] | 220.19579763  | 336.80801102  | -193.25078963 | 384.59629307  | 211.14978403  |
| ## | [9366] | 136.37529520  | -35.42825345  | 148.24571089  | 250.78050075  | 281.73651798  |
| ## | [9371] | 259.45665669  | 126.58874552  | 98.47093039   | 293.29269400  | 373.28835307  |
| ## | [9376] | 361.16783200  | 214.95760338  | 139.92505457  | 276.33596339  | 120.23668992  |
| ## | [9381] | 167.32041382  | 339.96156551  | 155.81562665  | 60.23659523   | 319.10681003  |
| ## | [9386] | 98.96471756   | -28.03327854  | 153.86163712  | 124.71672607  | 262.71295650  |
| ## | [9391] | 381.41884564  | 47.93232303   | 390.53548915  | 58.19291802   | 230.61915188  |
| ## | [9396] | 97.50068704   | -41.53775346  | 277.08500335  | 494.57663813  | 248.89000683  |
| ## | [9401] | -133.54259641 | 281.59436201  | 137.77427733  | -154.97946442 | -89.75372507  |
| ## | [9406] | 33.67043219   | 44.26904820   | 95.46441280   | -33.54630630  | 242.95425171  |
| ## | [9411] | 173.46383765  | 63.95095313   | 378.14431613  | 339.17650111  | 442.31775661  |
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| ## | [9421] | 134.06414784  | -16.31908974  | 113.72291113  | 279.55509276  | 358.38390786  |
| ## | [9426] | 23.16126401   | 379.16952295  | 203.13991633  | 173.73625283  | 148.93334725  |
| ## | [9431] | 186.83747277  | 303.01561809  | -61.75158697  | 216.11940378  | 441.06997637  |
| ## | [9436] | 448.32300355  | -17.86276462  | 107.62664996  | 119.09146250  | 271.99687773  |
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| ## | [9446] | 307.80123615  | 145.76744084  | 93.70532881   | 430.29611538  | -9.23960989   |
| ## | [9451] | -66.96848572  | 326.25746094  | 291.45666164  | 132.86260104  | 228.17328619  |
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| ## | [9466] | 107.21240208  | 68.40520406   | 228.01642329  | 117.70382644  | 86.96157285   |

|    |        |               |               |               |               |               |
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| ## | [9471] | 324.49313798  | 174.69386663  | 198.49579814  | 253.02735231  | 145.50552469  |
| ## | [9476] | -95.70431384  | 95.96808672   | 435.00089543  | 481.84703005  | -14.81348853  |
| ## | [9481] | 305.11378906  | 143.84557992  | 237.98668802  | 85.67735580   | 156.11828419  |
| ## | [9486] | 275.68837380  | 113.39801656  | 5.32157326    | 195.13239614  | 127.58722481  |
| ## | [9491] | 67.22019436   | 153.13212296  | 224.23067652  | 514.66068810  | -175.44194387 |
| ## | [9496] | 249.17773207  | -26.19995422  | 145.49617845  | 416.30975838  | 3.93514688    |
| ## | [9501] | -75.83392500  | 28.03363934   | 193.93937167  | 552.40742542  | 234.58426770  |
| ## | [9506] | -186.71555917 | 0.24946974    | 254.65933012  | 58.09911394   | 41.75388306   |
| ## | [9511] | -129.22527271 | 5.74986067    | 178.40804484  | 183.77853829  | 181.14798971  |
| ## | [9516] | 37.31322891   | 154.36241839  | 377.56373951  | 83.56179411   | 99.33933362   |
| ## | [9521] | -10.64913999  | -2.86959115   | 197.26204671  | -16.15023309  | 90.63232079   |
| ## | [9526] | 353.68113596  | 348.43861050  | 206.02741913  | 183.12717084  | -21.78613280  |
| ## | [9531] | 339.77668552  | -66.68996882  | 333.35140286  | 1.60591849    | -48.40995660  |
| ## | [9536] | 277.78093593  | 70.48708580   | 44.00755445   | 202.98571818  | 96.87035130   |
| ## | [9541] | 2.31994622    | -54.93557260  | 62.71390558   | 269.63544350  | 294.58825063  |
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| ## | [9551] | 144.42508295  | 154.06112993  | 20.27152711   | 391.92776904  | 144.39458138  |
| ## | [9556] | 169.41335639  | 194.31964884  | 16.20235663   | 175.00713391  | 264.49222171  |
| ## | [9561] | 260.82005067  | 294.66716621  | 496.97876955  | -10.88318523  | 2.18254971    |
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| ## | [9576] | 85.37801657   | 368.68669850  | 278.22453602  | -51.02251824  | 282.28323383  |
| ## | [9581] | -46.20742558  | 136.73636203  | 113.27348236  | 168.79398559  | 185.23906782  |
| ## | [9586] | 262.63496501  | 311.47641606  | 170.65093148  | -185.67012931 | 260.55307429  |
| ## | [9591] | 116.59660861  | 252.07272025  | 187.28675992  | 70.87138262   | -25.89671559  |
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| ## | [9601] | 25.90563046   | 13.12877009   | 320.19115673  | 423.01159551  | 228.27830848  |
| ## | [9606] | 221.73485960  | 272.00856521  | 110.52989464  | -3.26976189   | 131.99315111  |
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| ## | [9616] | 148.26385297  | 341.81345398  | 105.38777819  | -54.01864362  | 167.28106963  |
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| ## | [9631] | 60.68925270   | 323.93076004  | -49.35916756  | 580.36094034  | -154.56859431 |
| ## | [9636] | 125.49576685  | 225.16597530  | -76.34808913  | 85.82641487   | 205.19417160  |
| ## | [9641] | 399.69302181  | 429.62403798  | 223.12878179  | 296.53370267  | 172.24364888  |
| ## | [9646] | 92.50862303   | 441.70586748  | 190.03890945  | 168.59632420  | 233.71322236  |
| ## | [9651] | 13.63921406   | 420.19568179  | 188.99848982  | -262.29485112 | 182.75772793  |
| ## | [9656] | 307.26113416  | 104.54243228  | 372.64032837  | 92.37849748   | 138.00675888  |
| ## | [9661] | 92.79415061   | 120.56060322  | 359.39245938  | 90.01153276   | -94.76182109  |
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| ## | [9681] | 118.91186215  | 118.87354107  | 30.05404706   | 337.39151764  | 188.41047096  |
| ## | [9686] | 343.74476339  | 457.19385592  | -23.78468288  | 191.33541713  | -4.28626029   |
| ## | [9691] | 221.90880349  | 138.25016523  | 64.24502510   | 331.29367569  | 124.09669759  |
| ## | [9696] | -173.23520477 | -34.54112431  | 116.79195897  | 84.35587453   | 170.91788152  |
| ## | [9701] | 128.14925014  | 423.04876554  | -115.13387914 | 87.23288473   | 91.90884911   |
| ## | [9706] | 266.56655741  | 85.85261052   | 495.91983650  | 96.32556670   | 194.21099600  |
| ## | [9711] | 401.28125436  | 268.26833529  | 152.76307360  | 235.24066012  | -87.92769245  |
| ## | [9716] | -180.80509688 | -188.92413750 | 496.28615552  | 138.42198738  | 48.57033588   |
| ## | [9721] | 279.09331012  | 317.84615259  | 117.47881540  | -91.58234739  | -60.52125244  |
| ## | [9726] | 369.10353773  | 21.40100468   | 432.48459272  | 280.88799053  | 138.43939779  |
| ## | [9731] | 349.06632642  | -56.24679359  | 111.74094975  | 350.25789568  | 23.42549037   |
| ## | [9736] | 1.44555950    | 53.13783307   | 406.84051787  | 430.48635309  | -10.05021906  |

|    |        |               |               |               |               |               |
|----|--------|---------------|---------------|---------------|---------------|---------------|
| ## | [9741] | 187.01279763  | 313.76019212  | 216.14478519  | 197.25338930  | 162.71143295  |
| ## | [9746] | 87.17118363   | 378.87579738  | 209.94692108  | 50.63502223   | -97.43254491  |
| ## | [9751] | -37.08429712  | 371.96485519  | 139.83046365  | 266.64414587  | -0.07988424   |
| ## | [9756] | 270.38569577  | 289.32358099  | 449.37232456  | -107.61293516 | 65.36536618   |
| ## | [9761] | 139.56789704  | -97.26656363  | -146.51926054 | 451.17018052  | 222.57563677  |
| ## | [9766] | 277.85237598  | -155.57514452 | 421.22189253  | 177.73902786  | 507.80960386  |
| ## | [9771] | 276.14067258  | 436.62275407  | 165.98082522  | 51.97807911   | -54.85402519  |
| ## | [9776] | 11.95531046   | 37.74872021   | 553.97435204  | -46.49377740  | 83.61772703   |
| ## | [9781] | 280.25448839  | 200.90399430  | 140.88966174  | 380.43005495  | 324.81562180  |
| ## | [9786] | 131.76495143  | 230.38873561  | 218.32048845  | 11.79875601   | 89.87521863   |
| ## | [9791] | 159.41999055  | 126.59859097  | 72.06342928   | 0.18844390    | 160.26294292  |
| ## | [9796] | 31.40982548   | 168.20220741  | 92.11548572   | -48.78291498  | 104.77132969  |
| ## | [9801] | 176.21758975  | 183.70187596  | 152.40730732  | 474.34656451  | -207.78713432 |
| ## | [9806] | 390.14255796  | -7.70856287   | 167.73552810  | 58.07112030   | 66.59880057   |
| ## | [9811] | 355.65405039  | 110.63436405  | 32.18519700   | 252.40665516  | 46.52204382   |
| ## | [9816] | -54.09198158  | 247.46205638  | -3.87949207   | 24.72411578   | 274.71010122  |
| ## | [9821] | 196.00760274  | 49.21741984   | -106.86834669 | 264.90078578  | 319.35401985  |
| ## | [9826] | 21.86064665   | -95.87911699  | 360.05843936  | 288.87851770  | 289.87626017  |
| ## | [9831] | -73.30890702  | 226.59538052  | 81.42727401   | 390.99970728  | 167.37592881  |
| ## | [9836] | 288.64268228  | 139.68317734  | 473.65925564  | -73.89578346  | -22.30905391  |
| ## | [9841] | -10.92293129  | 198.78988977  | -9.34221358   | 277.59281347  | 113.51646577  |
| ## | [9846] | 174.36552290  | -82.13552077  | 175.71956436  | 97.93226348   | 135.91109311  |
| ## | [9851] | 366.43827609  | -74.52770727  | 35.97003030   | 347.20946737  | 245.65857871  |
| ## | [9856] | 64.80615026   | 254.93069130  | 308.50950141  | 98.71525040   | 268.75842117  |
| ## | [9861] | 280.45482283  | -78.06800607  | 46.97099477   | 320.64491015  | 69.49384340   |
| ## | [9866] | 161.19757245  | 42.73652989   | 177.73745206  | 242.22686850  | 61.75067536   |
| ## | [9871] | 68.66438854   | 137.75721728  | -18.73757176  | 267.31606673  | 134.93615275  |
| ## | [9876] | 254.35659521  | 236.85941284  | 14.50713910   | -7.12043034   | 145.74420686  |
| ## | [9881] | -1.86765916   | 44.77910198   | 322.99882638  | 335.19124111  | 453.77165897  |
| ## | [9886] | 200.18006318  | 149.76465521  | 127.11467272  | 144.69693514  | -123.42863255 |
| ## | [9891] | 112.19857206  | 289.11593653  | 99.22906199   | -26.73799365  | 26.94444858   |
| ## | [9896] | 83.50761896   | -51.28552452  | 190.43357749  | 236.22132301  | 223.58816721  |
| ## | [9901] | 322.68330570  | 230.28263529  | 124.53361056  | 205.97335111  | 37.68611910   |
| ## | [9906] | -30.14027288  | 125.89895573  | 76.30696525   | 272.54134407  | 9.80249637    |
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| ## | [9921] | 253.31047878  | 12.09714597   | 120.34929420  | 606.26736427  | 176.60325781  |
| ## | [9926] | 400.50260793  | 59.31060916   | -137.21154044 | -182.25044333 | 215.82638135  |
| ## | [9931] | 313.45482573  | 47.02221267   | 506.44721547  | 204.59115281  | 133.14247085  |
| ## | [9936] | 111.31911733  | 519.35258788  | 167.32758855  | -37.99892280  | 36.21477955   |
| ## | [9941] | 135.85007552  | 311.40690347  | 124.49043861  | 251.55439832  | -295.08539084 |
| ## | [9946] | 259.95802705  | 402.73660347  | 239.98434486  | -139.71046777 | -62.14880225  |
| ## | [9951] | 231.09273715  | 96.78032375   | 15.24126776   | -60.85619482  | 189.53407715  |
| ## | [9956] | -124.38272320 | 161.25670232  | 324.72260914  | 266.52534568  | 385.91374407  |
| ## | [9961] | 144.42784627  | 35.87829722   | 124.44116367  | 217.14168866  | 353.93422844  |
| ## | [9966] | 226.93529838  | 16.80043873   | 238.26086838  | 72.03695034   | -89.47291141  |
| ## | [9971] | -18.71501099  | 344.23838915  | 189.69160123  | 45.95496480   | 200.70223221  |
| ## | [9976] | 156.39493194  | 345.39332108  | 257.05433325  | 588.45464860  | -135.56182157 |
| ## | [9981] | 114.25587840  | 169.00605396  | 145.86418608  | 79.77941067   | 181.43538477  |
| ## | [9986] | 288.99950693  | 64.09026014   | -12.62657407  | 97.75114304   | 165.61243113  |
| ## | [9991] | -27.21430442  | 164.17714219  | 408.01338085  | 483.68368248  | -57.57593878  |
| ## | [9996] | 259.53760974  | 392.84230395  | 76.37284342   | 106.38004986  | 204.82623867  |

## Q2 (ii)

```
# Code for Question 2 part 2
sample_size=100
unif_sample=sample(uniform_heights,size=sample_size)
pois_sample=sample(poisson_heights,size=sample_size)
norm_sample=sample(normal_heights,size=sample_size)

sample_mean_unif=mean(unif_sample)
sample_mean_pois=mean(pois_sample)
sample_mean_norm=mean(norm_sample)

cat("Sample Mean of Uniform Data:", sample_mean_unif, "\n")
```

```
## Sample Mean of Uniform Data: 148.394
```

```
cat("Sample Mean of Poisson Data:", sample_mean_pois, "\n")
```

```
## Sample Mean of Poisson Data: 159.56
```

```
cat("Sample Mean of Normal Data:", sample_mean_norm, "\n")
```

```
## Sample Mean of Normal Data: 147.5686
```

## Q2 (iii)

```
# Code for Question 2 part 3
sample_size <- 100
simulations <- 1000

sample_means_uniform <- numeric(simulations)

for (i in 1:simulations) {
  uniform_sample <- sample(uniform_heights, size = sample_size)
  sample_means_uniform[i] <- mean(uniform_sample)
}

sample_means_poisson <- numeric(simulations)

for (i in 1:simulations) {
  poisson_sample <- sample(poisson_heights, size = sample_size)
  sample_means_poisson[i] <- mean(poisson_sample)
}

sample_means_normal <- numeric(simulations)

for (i in 1:simulations) {
  normal_sample <- sample(normal_heights, size = sample_size)
```

```

sample_means_normal[i] <- mean(normal_sample)
}

```

```
sample_means_uniform
```

```

##      [1] 188.0194 175.6548 169.2397 159.6952 161.7848 175.3703 155.0540 148.3668
##      [9] 166.0133 149.8930 164.1832 163.6957 170.3248 164.3178 147.8223 166.4750
##     [17] 162.6853 147.3765 159.9895 168.4139 157.9835 166.1259 147.4567 158.2641
##     [25] 161.9196 154.6841 166.4966 145.7918 145.5432 162.5739 177.3003 161.2618
##     [33] 156.3699 146.6878 160.0368 165.1968 152.9012 153.1487 164.2075 166.0761
##     [41] 153.2535 168.3533 160.6390 160.7875 164.8142 167.2628 153.3666 157.1784
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##     [73] 176.7706 149.8010 163.2820 146.8358 169.7454 162.2244 152.0472 156.7732
##     [81] 147.2464 150.9652 155.5460 158.7247 166.1814 155.8717 165.1950 157.7167
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## [849] 157.1251 164.1593 167.6840 174.3322 139.3784 160.2441 158.6841 178.9376
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## [881] 151.8323 155.1505 160.7839 149.3213 168.9691 150.9880 151.0766 154.4732
## [889] 157.8941 169.5522 169.7279 171.2774 142.4480 148.3935 150.3345 146.4480
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## [857] 147.2049 149.8494 162.8018 186.3149 154.1790 166.5240 168.7955 110.7583
## [865] 164.1409 162.7763 144.0565 152.2749 130.0970 152.8463 159.4247 171.2161
## [873] 147.5880 144.9650 135.5108 195.0749 137.4468 155.9577 152.1180 123.8502
## [881] 171.9961 158.7153 149.3139 166.1666 155.3656 178.5542 167.9533 155.9815
## [889] 173.6754 156.0606 184.2699 169.3360 164.4135 166.8300 151.1005 122.0444
## [897] 149.8608 141.9339 159.9778 167.7918 167.3600 164.9016 196.0745 146.1515
## [905] 163.6547 158.5915 179.5186 148.7484 159.5348 151.9071 146.0801 150.0393
## [913] 136.8798 135.1514 163.1413 151.1933 133.2344 165.3604 131.4533 157.2623
## [921] 140.2366 145.4023 142.5012 152.1931 127.1143 156.0457 170.3446 152.1305
## [929] 146.3860 147.2594 153.7889 191.0751 179.9611 160.3634 161.3232 139.1207
## [937] 153.1915 145.1452 162.8062 164.4576 170.2976 184.8107 180.1279 185.9232
## [945] 154.1958 160.2971 145.6680 188.2025 129.5069 169.1846 151.0546 161.7534
## [953] 157.0035 131.8899 138.3252 158.1022 142.5211 138.2042 144.1442 168.1573
## [961] 168.2559 155.5277 176.8636 136.1573 181.1548 139.8586 161.4097 146.1876
## [969] 172.3329 162.3611 160.0351 150.0863 145.7130 157.4654 169.1096 156.8778
## [977] 160.1300 182.1301 142.5093 156.0292 135.2128 152.1290 182.3476 117.3512
## [985] 184.8782 162.8480 131.8808 157.1336 141.0020 131.1337 149.2186 143.6749
## [993] 157.6568 164.2203 152.5763 147.1900 168.9198 146.3585 161.7180 148.3704
```

## Q2 (iv)

```
# Code for Question 2 part 4
population_mean_uniform <- mean(uniform_heights)
population_mean_poisson <- mean(poisson_heights)
population_mean_normal <- mean(normal_heights)

# Standard Error for mean is given by sigma/root(n)

se_uniform <- sqrt(var(uniform_heights) / sample_size)
se_poisson <- sqrt(var(poisson_heights) / sample_size)
se_normal <- sqrt(var(normal_heights) / sample_size)
```

```
cat("Population Mean of Uniform Data:", population_mean_uniform, "\n")
```

```
## Population Mean of Uniform Data: 159.2158
```

```
cat("Population Mean of Poisson Data:", population_mean_poisson, "\n")
```

```
## Population Mean of Poisson Data: 159.917
```

```
cat("Population Mean of Normal Data:", population_mean_normal, "\n")
```

```
## Population Mean of Normal Data: 157.0435
```

```
cat("\n")
```

```
cat("Standard Error of Uniform Data:", se_uniform, "\n")
```

```
## Standard Error of Uniform Data: 9.174199
```

```
cat("Standard Error of Poisson Data:", se_poisson, "\n")
```

```
## Standard Error of Poisson Data: 1.26688
```

```
cat("Standard Error of Normal Data:", se_normal, "\n")
```

```
## Standard Error of Normal Data: 16.02509
```

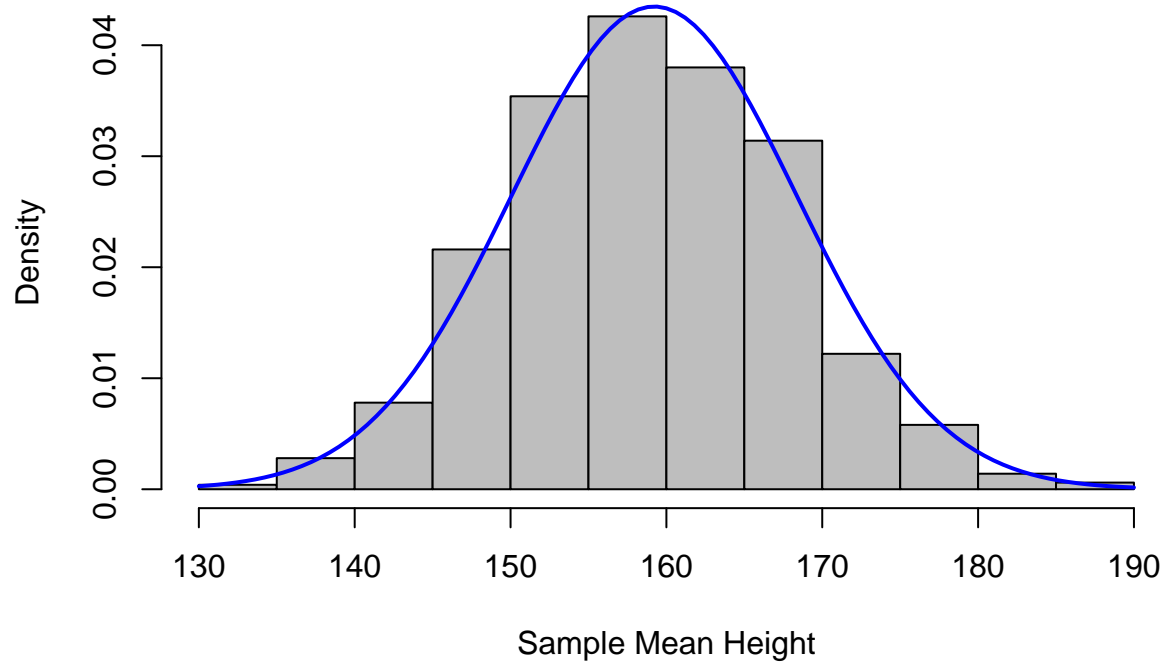
## Q2 (v)

```
# Code for Question 2 part 5 (1)
```

```
hist(sample_means_uniform, main = "Histogram of Sample Means (Uniform Distribution)", xlab = "Sample Mea
```

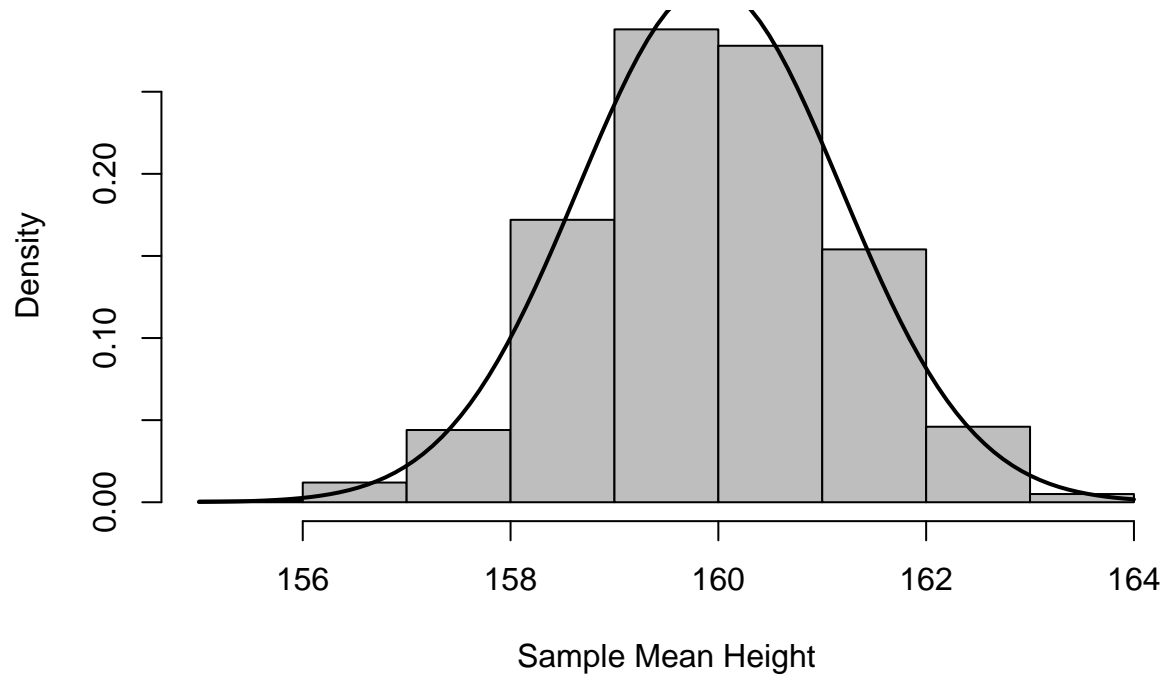
```
curve(dnorm(x, mean = population_mean_uniform, sd = se_uniform), add = TRUE, col = "blue", lwd = 2)
```

## Histogram of Sample Means (Uniform Distribution)



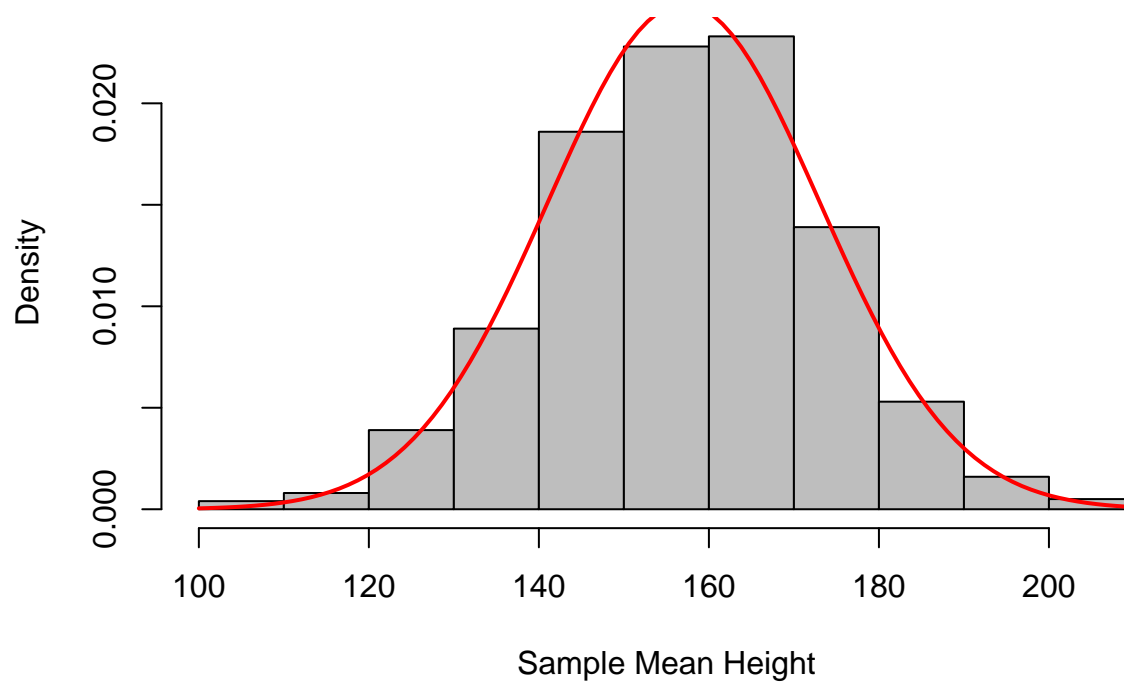
```
# Code for Question 2 part 5 (2)
hist(sample_means_poisson, main = "Histogram of Sample Means (Poisson Distribution)", xlab = "Sample Mean Height", ylab = "Density", col = "gray", lwd = 2)
curve(dnorm(x, mean = population_mean_poisson, sd = se_poisson), add = TRUE, col = "black", lwd = 2)
```

## Histogram of Sample Means (Poisson Distribution)



```
# Code for Question 2 part 5 (3)
hist(sample_means_normal, main = "Histogram of Sample Means (Normal Distribution)", xlab = "Sample Mean Height", ylab = "Density", col = "gray", lwd = 2)
curve(dnorm(x, mean = population_mean_normal, sd = se_normal), add = TRUE, col = "red", lwd = 2)
```

## Histogram of Sample Means (Normal Distribution)



# Q2 (vi)

# Remark for Question 2 part 6

#The Central Limit Theorem (CLT) plays a significant role in the convergence of sample means to a normal distribution.

All the sub-parts of the questions are done here. What we did here is that, since the population size is 10,000 (which is a large number) it is very difficult and time consuming to study the height of 10,000 individuals. So we will study only 100 by randomly sampling from the population. If we pick one random sample of size 100 from 10,000 then the sample might not depict the properties of the population very well, i.e the mean and standard deviation might differ a lot. To ensure that, we will do this experiment of picking samples huge number of times, so that we will have 2000 small samples of size = 100. This is the prime idea of Central Limit Theorem. The more number of samples we pick, collectively it will depict the population much better. Then as we can see the sample means of each distribution is almost same as the population means of each distribution respectively, validating this result.

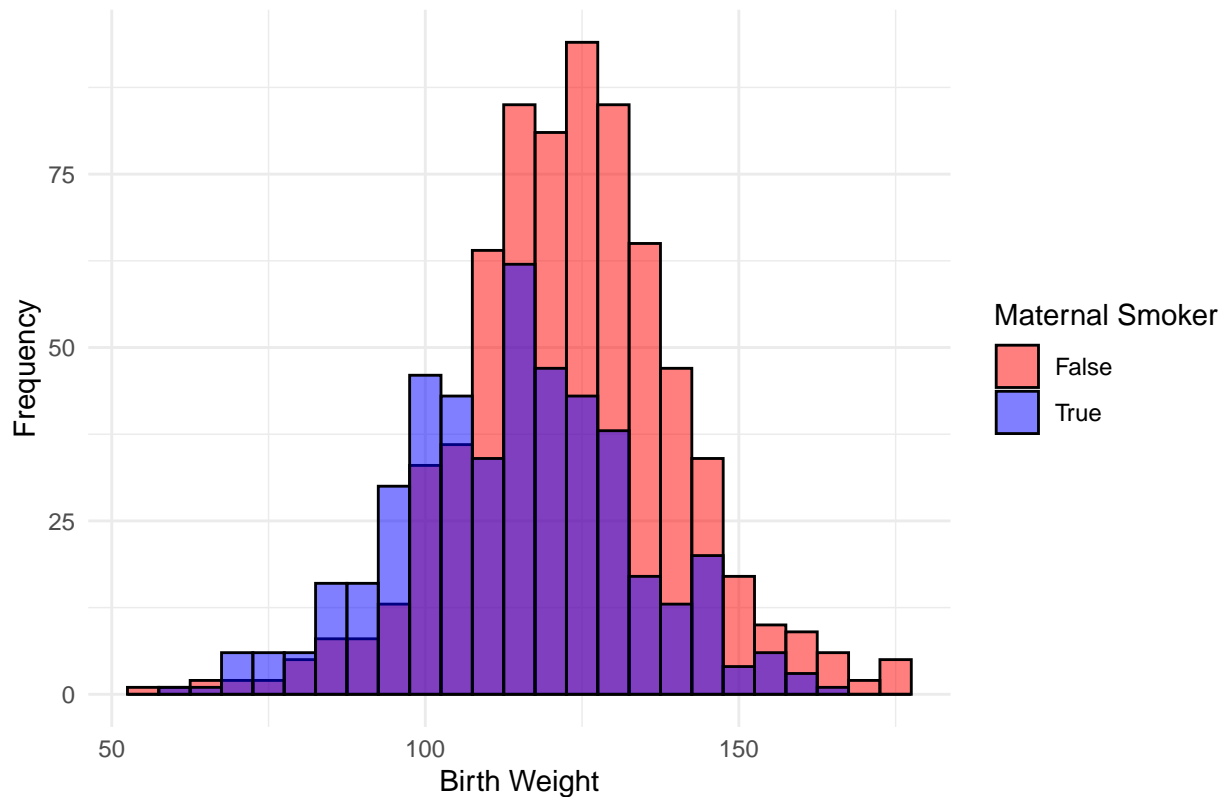
### Q3 (i)

```
# Code for Question 3 part 1
library(ggplot2)
df=read.csv('baby.csv')
gg <- ggplot(df, aes(x = Birth.Weight, fill = Maternal.Smoker))

gg +
  geom_histogram(binwidth = 5, position = "identity", alpha = 0.5,col="black") +
  labs(
    title = "Overlaying Histograms of Birth Weight by Maternal Smoker Status",
    x = "Birth Weight",
    y = "Frequency",
    fill = "Maternal Smoker"
  ) +
  scale_fill_manual(values = c("False" = "red", "True" = "blue")) +
  theme_minimal()
```



## Overlaying Histograms of Birth Weight by Maternal Smoker Status



```
result <- tapply(df$Birth.Weight, df$Maternal.Smoker, mean)
cat('Mean for Maternal Smoker(NO) :',result[1],'\n')
```

```
## Mean for Maternal Smoker(NO) : 123.0853
```

```
cat('Mean for Maternal Smoker(YES) :',result[2],'\n')
```

```
## Mean for Maternal Smoker(YES) : 113.8192
```

```
cat("It can be observed that the average weight of the child whose mother do not smoke is higher as compa")
```

```
## It can be observed that the average weight of the child whose mother do not smoke is higher as compa
```

### Q3 (ii)

```
# Code for Question 3 part 2
result1 <- tapply(df$Birth.Weight, df$Maternal.Smoker, mean)
cat('Mean for Maternal Smoker(NO) :',result[1],'\n')
```

```
## Mean for Maternal Smoker(NO) : 123.0853
```

```
cat('Mean for Maternal Smoker(YES) :',result[2],'\n')
```

```
## Mean for Maternal Smoker(YES) : 113.8192
```

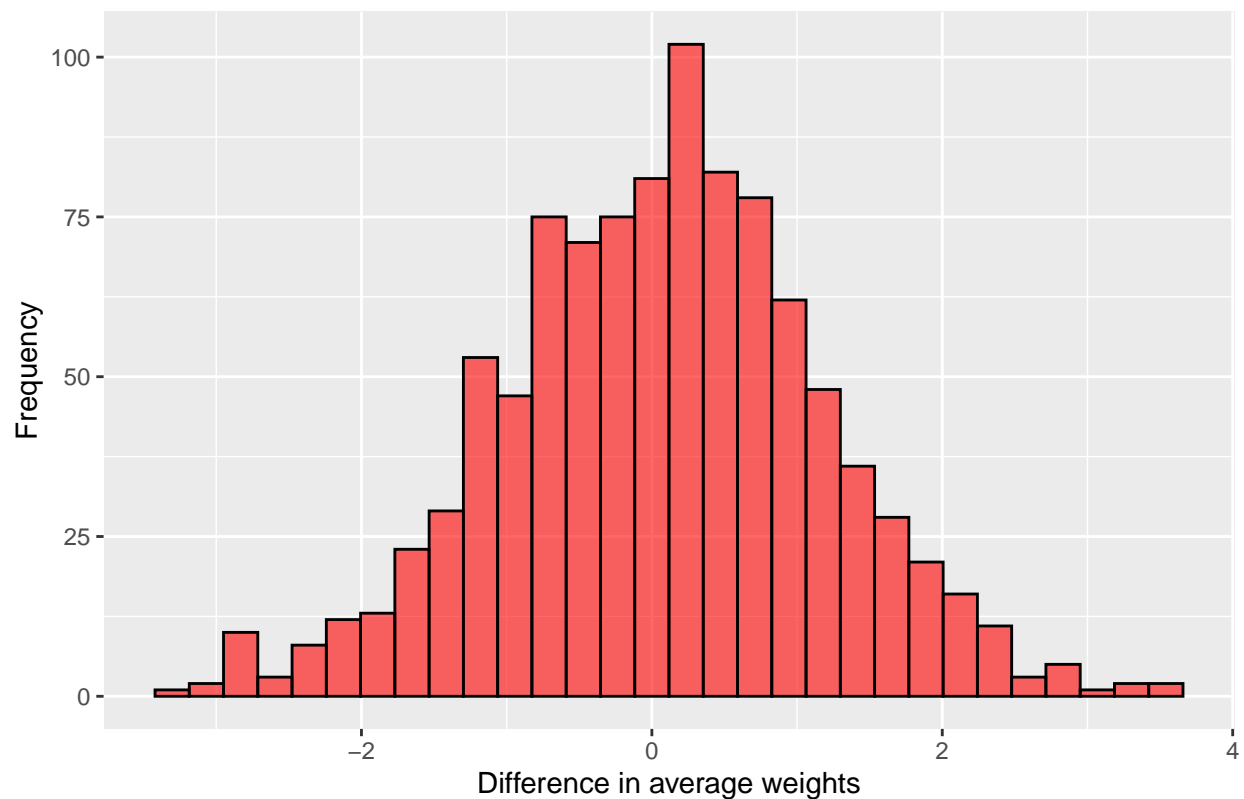
```
cat('The difference between the average weight of the smoking group and the average weight  
of the non-smoking group :',result1[1]-result1[2])
```

```
## The difference between the average weight of the smoking group and the average weight  
## of the non-smoking group : 9.266143
```

### Q3 (iii)

```
# Code for Question 3 part 3  
df1=read.csv('baby.csv')  
sim=1000  
v=numeric(sim)  
for (i in 1:1000){  
  df1$Maternal.Smoker<-sample(df$Maternal.Smoker)  
  result <-tapply(df1$Birth.Weight,df1$Maternal.Smoker, mean)  
  v[i]=(result[1]-result[2])  
}  
df3=data.frame(v)  
ggplot(df3,aes(x=v))+  
  geom_histogram(bins = 30, fill = "red", color = "black",alpha = 0.6)+  
  labs(  
    title = "Differences in Average weights after shuffling the Maternal.Smoker Column",  
    x = "Difference in average weights",  
    y = "Frequency"  
  )
```

Differences in Average weights after shuffling the Maternal.Smoker Column



```
cat('Mean of the differences:',mean(v),'\n')
```

```
## Mean of the differences: 0.06395865
```

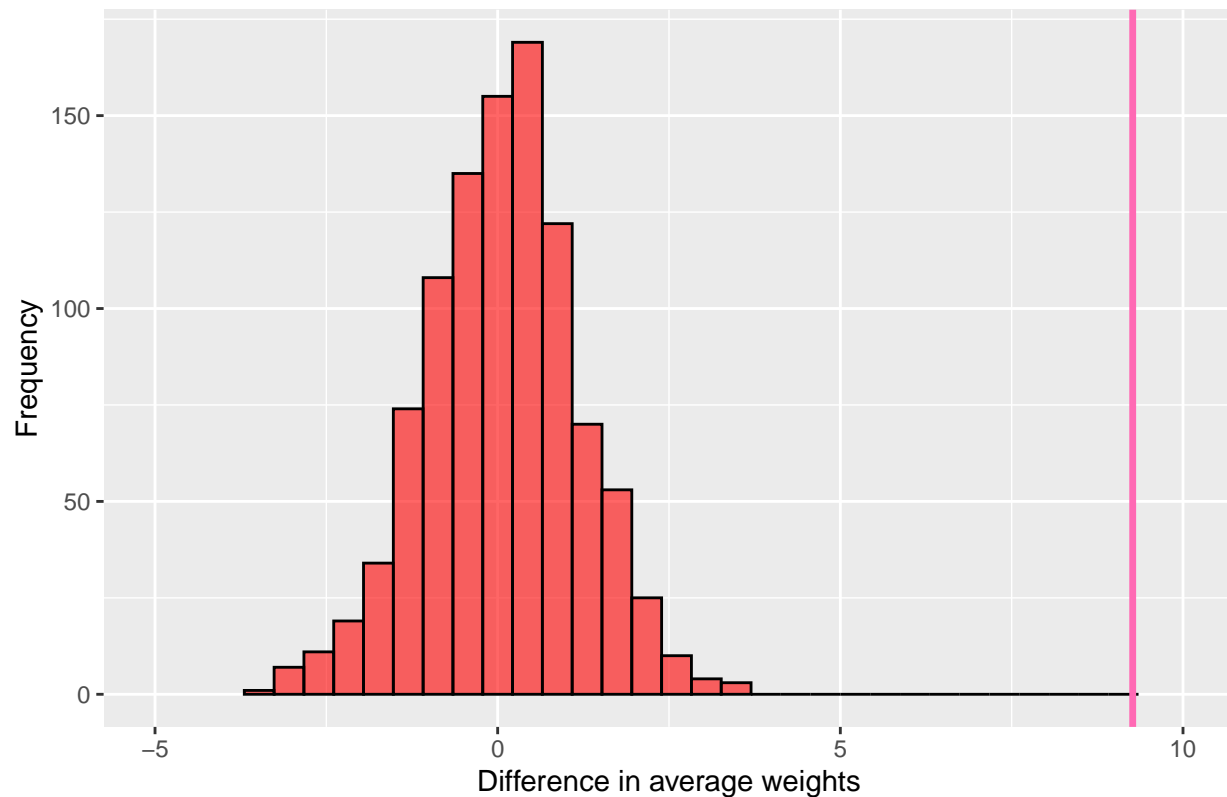
```
cat('Variance of the differences:',var(v),'\n')
```

```
## Variance of the differences: 1.211772
```

```
# Code for Question 3 part 4
ggplot(df3,aes(x=v))+
  geom_histogram(bins = 30, fill = "red", color = "black",alpha = 0.6)+
  geom_vline(xintercept=result1[1]-result1[2],col="hotpink", size = 1.2)+
  coord_cartesian(xlim=c(-5,10))+
  labs(
    title = "Actual observed difference and difference after shuffling",
    x = "Difference in average weights",
    y = "Frequency"
  )
```

```
## Warning: Using 'size' aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use 'linewidth' instead.
## This warning is displayed once every 8 hours.
## Call 'lifecycle::last_lifecycle_warnings()' to see where this warning was
## generated.
```

Actual observed difference and difference after shuffling



```
# Code for Question 3 part 5
obs_diff=result1[1]-result1[2]
me=mean(v)
va=var(v)
sd=sqrt(va)
cat('The actual observed difference(Before Shuffling):',obs_diff=result1[1]-result1[2],'\n')
```

```
## The actual observed difference(Before Shuffling): 9.266143
```

```
cat('Mean of the differences(After Shuffling):',mean(v),'\n')
```

```
## Mean of the differences(After Shuffling): 0.06395865
```

```
cat('Standard Deviation of the differences:',sd,'\n')
```

```
## Standard Deviation of the differences: 1.100805
```

```
cat('No of Standard Deviations the observed difference is from the mean of the
simulated variables :',ceiling((obs_diff-me)/sd))
```

```
## No of Standard Deviations the observed difference is from the mean of the
## simulated variables : 9
```

So, here we have a dataset containing the information of the weight of a newborn baby, weight of the mother and whether the mother smokes or not. We will try to make a conclusion, that whether smoking effects the weight of a newborn baby or not, We will do this by using a technique called “Random Permutations” and finding the count of standard deviation to conclude our result. In the first histogram we can see that the average weight of the baby is more in case of non-smoking mothers than the average weight of the smoking mothers. Then we will see the difference of this weight, and name it “observed difference”. Then we will shuffle the Maternal.Smoker columns and find the difference of the weights of smoking and non-smoking case. And we will do this a huge number of times (10000 in this case). Then we will plot a histogram of these differences and we can clearly see the mean lies near “0”. But our “observed difference” was approximately 9. Hence there is a huge gap between those numbers. And if we find the count of standard deviations the observed difference is from the mean of the simulated variables we will get 9. Since 9 is big enough we will conclude Smoking does effect the weight of a baby a lot.