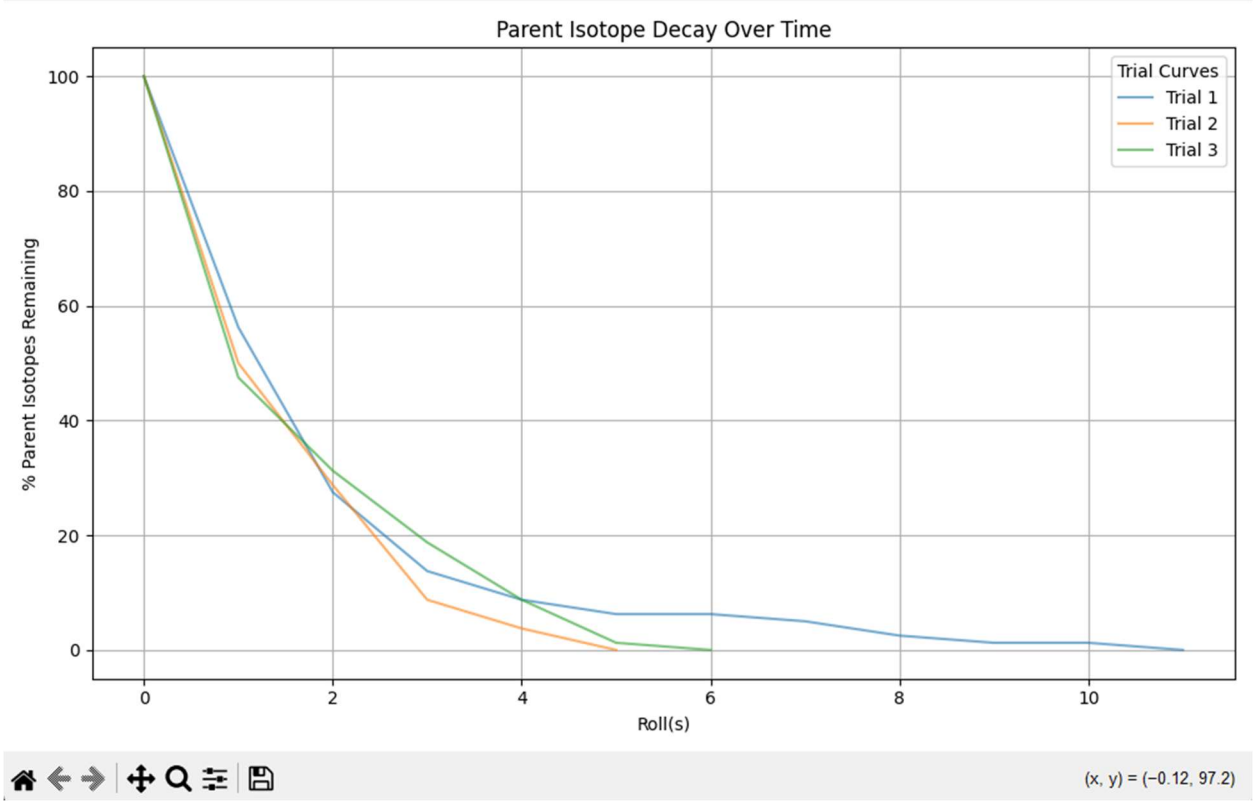
0987uyghjnm/DiceDecaySimulation – Program_Example_Execution

In this document, I'll show you what the program could do if you ran it:

This example is going to show you what the program will output if you decide to choose an Odd/Even experiment and run 3 trials. You can choose more or less trials.

```
============================================================
               WELCOME TO THE DICE DECAY SIMULATION
============================================================
This simulation models radioactive decay using virtual dice.
You'll choose a decay rule and see how 'parent isotopes' decay over time.
Each roll simulates the passage of time. Have fun!!


Choose an experiment to run (3 to exit):

1:  Odd (Parent) / Even (Daughter)
2:  1-5 (Parent) / 6 (Daughter)

Enter choice (1 or 2): 1

How many trials do you want to run? 3

=== Trial 1 (Odd (Parent) / Even (Daughter)) ===
Roll(s) Dice Left   Parents   Daughters   % Parents Left    % Daughters Left    Prob (decay)
0       80          80        0           100.00            0.00                0.0000
-------------------------------------------------------------------------------------------
1       80          45        35          56.25             43.75               0.4375
2       45          22        23          27.50             72.50               0.5111
3       22          11        11          13.75             86.25               0.5000
4       11          7         4           8.75              91.25               0.3636
5       7           5         2           6.25              93.75               0.2857
6       5           5         0           6.25              93.75               0.0000
7       5           4         1           5.00              95.00               0.2000
8       4           2         2           2.50              97.50               0.5000
9       2           1         1           1.25              98.75               0.5000
10      1           1         0           1.25              98.75               0.0000
11      1           0         1           0.00              100.00              1.0000

=== Trial 2 (Odd (Parent) / Even (Daughter)) ===
Roll(s) Dice Left   Parents   Daughters   % Parents Left    % Daughters Left    Prob (decay)
0       80          80        0           100.00            0.00                0.0000
-------------------------------------------------------------------------------------------
1       80          40        40          50.00             50.00               0.5000
2       40          23        17          28.75             71.25               0.4250
3       23          7         16          8.75              91.25               0.6957
4       7           3         4           3.75              96.25               0.5714
5       3           0         3           0.00              100.00              1.0000

=== Trial 3 (Odd (Parent) / Even (Daughter)) ===
Roll(s) Dice Left   Parents   Daughters   % Parents Left    % Daughters Left    Prob (decay)
0       80          80        0           100.00            0.00                0.0000
-------------------------------------------------------------------------------------------
1       80          38        42          47.50             52.50               0.5250
2       38          25        13          31.25             68.75               0.3421
3       25          15        10          18.75             81.25               0.4000
4       15          7         8           8.75              91.25               0.5333
5       7           1         6           1.25              98.75               0.8571
6       1           0         1           0.00              100.00              1.0000
```

Then it'll output another window that will display the following:



This example here is if you decide to pick the 1-5 / 6 experiment, meaning that the 1-5 is parent isotopes and 5 is the daughter isotopes:

Upon executing the program this is what it'll look like:

```
======================================================================
               WELCOME TO THE DICE DECAY SIMULATION
======================================================================
This simulation models radioactive decay using virtual dice.
You'll choose a decay rule and see how 'parent isotopes' decay over time.
Each roll simulates the passage of time. Have fun!!


Choose an experiment to run (3 to exit):

1:  Odd (Parent) / Even (Daughter)
2:  1-5 (Parent) / 6 (Daughter)

Enter choice (1 or 2): 2

How many trials do you want to run? 3
```

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```
=== Trial 1 (1-5 (Parent) / 6 (Daughter)) ===
Roll(s) Dice Left   Parents   Daughters   % Parents Left    % Daughters Left    Prob (decay)
0       80          80        0           100.00            0.00                0.0000
-------------------------------------------------------------------------------------------
1       80          65        15          81.25             18.75               0.1875
2       65          50        15          62.50             37.50               0.2308
3       50          37        13          46.25             53.75               0.2600
4       37          31        6           38.75             61.25               0.1622
5       31          26        5           32.50             67.50               0.1613
6       26          22        4           27.50             72.50               0.1538
7       22          19        3           23.75             76.25               0.1364
8       19          15        4           18.75             81.25               0.2105
9       15          11        4           13.75             86.25               0.2667
10      11          9         2           11.25             88.75               0.1818
11      9           8         1           10.00             90.00               0.1111
12      8           6         2           7.50              92.50               0.2500
13      6           5         1           6.25              93.75               0.1667
14      5           5         0           6.25              93.75               0.0000
15      5           5         0           6.25              93.75               0.0000
16      5           3         2           3.75              96.25               0.4000
17      3           2         1           2.50              97.50               0.3333
18      2           2         0           2.50              97.50               0.0000
19      2           2         0           2.50              97.50               0.0000
20      2           2         0           2.50              97.50               0.0000
21      2           1         1           1.25              98.75               0.5000
22      1           1         0           1.25              98.75               0.0000
23      1           1         0           1.25              98.75               0.0000
24      1           1         0           1.25              98.75               0.0000
25      1           0         1           0.00              100.00              1.0000

=== Trial 2 (1-5 (Parent) / 6 (Daughter)) ===
Roll(s) Dice Left   Parents   Daughters   % Parents Left    % Daughters Left    Prob (decay)
0       80          80        0           100.00            0.00                0.0000
-------------------------------------------------------------------------------------------
1       80          62        18          77.50             22.50               0.2250
2       62          47        15          58.75             41.25               0.2419
3       47          41        6           51.25             48.75               0.1277
4       41          31        10          38.75             61.25               0.2439
5       31          20        11          25.00             75.00               0.3548
6       20          17        3           21.25             78.75               0.1500
7       17          15        2           18.75             81.25               0.1176
8       15          8         7           10.00             90.00               0.4667
9       8           7         1           8.75              91.25               0.1250
10      7           5         2           6.25              93.75               0.2857
11      5           5         0           6.25              93.75               0.0000
12      5           5         0           6.25              93.75               0.0000
13      5           4         1           5.00              95.00               0.2000
14      4           3         1           3.75              96.25               0.2500
15      3           3         0           3.75              96.25               0.0000
16      3           3         0           3.75              96.25               0.0000
17      3           2         1           2.50              97.50               0.3333
18      2           1         1           1.25              98.75               0.5000
19      1           1         0           1.25              98.75               0.0000
20      1           1         0           1.25              98.75               0.0000
21      1           1         0           1.25              98.75               0.0000
22      1           1         0           1.25              98.75               0.0000
23      1           0         1           0.00              100.00              1.0000
```

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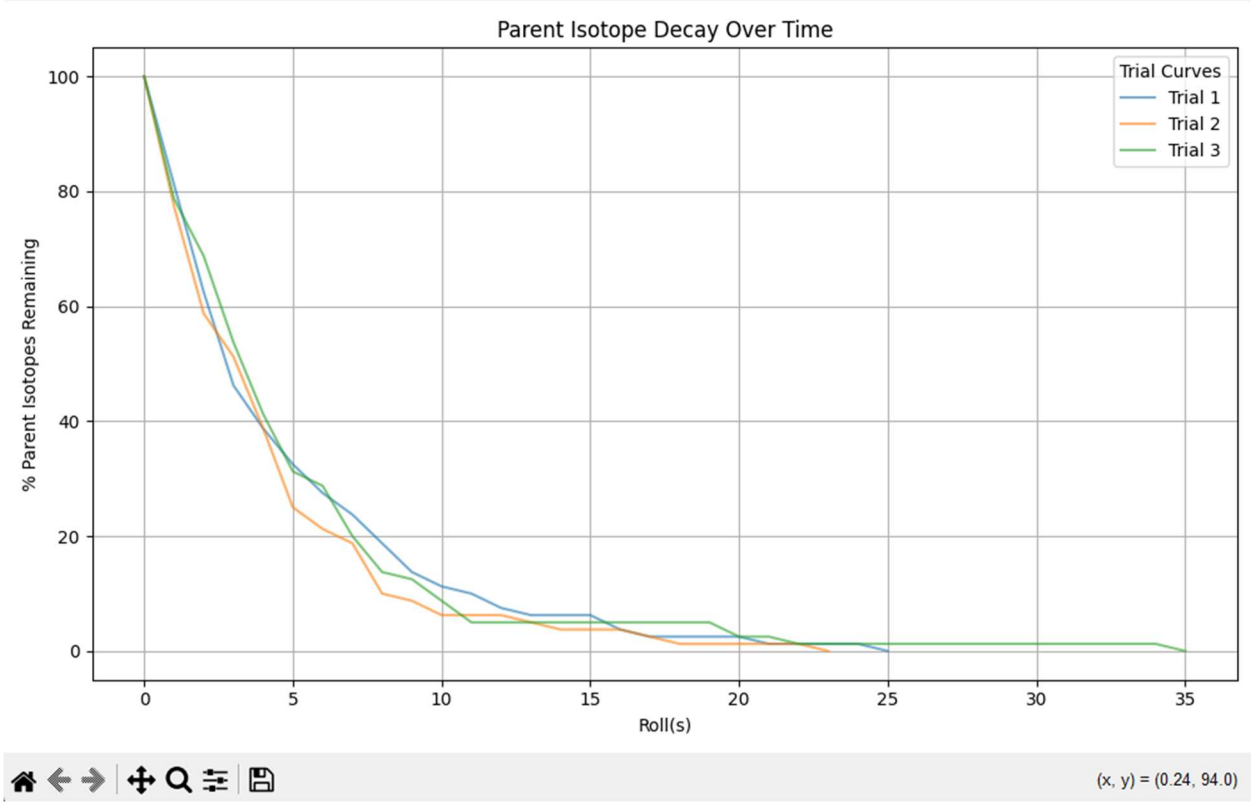
```
=== Trial 3 (1-5 (Parent) / 6 (Daughter)) ===
Roll(s) Dice Left   Parents   Daughters   % Parents Left    % Daughters Left    Prob (decay)
0       80          80        0           100.00            0.00                0.0000
-------------------------------------------------------------------------------------------
1       80          63        17          78.75             21.25               0.2125
2       63          55        8           68.75             31.25               0.1270
3       55          43        12          53.75             46.25               0.2182
4       43          33        10          41.25             58.75               0.2326
5       33          25        8           31.25             68.75               0.2424
6       25          23        2           28.75             71.25               0.0800
7       23          16        7           20.00             80.00               0.3043
8       16          11        5           13.75             86.25               0.3125
9       11          10        1           12.50             87.50               0.0909
10      10          7         3           8.75              91.25               0.3000
11      7           4         3           5.00              95.00               0.4286
12      4           4         0           5.00              95.00               0.0000
13      4           4         0           5.00              95.00               0.0000
14      4           4         0           5.00              95.00               0.0000
15      4           4         0           5.00              95.00               0.0000
16      4           4         0           5.00              95.00               0.0000
17      4           4         0           5.00              95.00               0.0000
18      4           4         0           5.00              95.00               0.0000
19      4           4         0           5.00              95.00               0.0000
20      4           2         2           2.50              97.50               0.5000
21      2           2         0           2.50              97.50               0.0000
22      2           1         1           1.25              98.75               0.5000
23      1           1         0           1.25              98.75               0.0000
24      1           1         0           1.25              98.75               0.0000
25      1           1         0           1.25              98.75               0.0000
26      1           1         0           1.25              98.75               0.0000
27      1           1         0           1.25              98.75               0.0000
28      1           1         0           1.25              98.75               0.0000
29      1           1         0           1.25              98.75               0.0000
30      1           1         0           1.25              98.75               0.0000
31      1           1         0           1.25              98.75               0.0000
32      1           1         0           1.25              98.75               0.0000
33      1           1         0           1.25              98.75               0.0000
34      1           1         0           1.25              98.75               0.0000
35      1           0         1           0.00              100.00              1.0000
```

This is what the graph would look like:

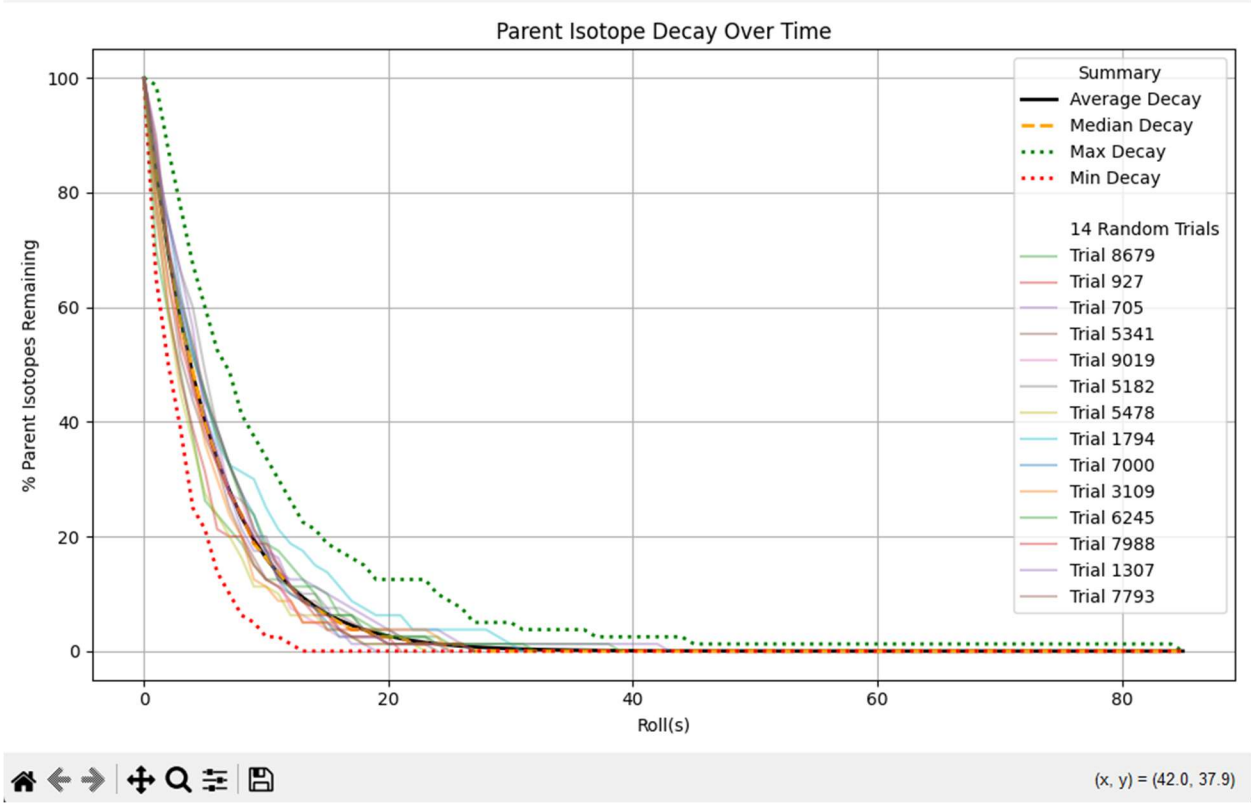


Now in this trial, I'm going to push the limits of the program by choosing option 2 but with 9999 trials, (Note: the number of trials are dependent on the processing power of your computer, it may or may not take time to process) it'll out put everything/all trials into the terminal and it'll will display the average, median, max and minimum decay curves, and then it'll show 14 random trials to illustrate the path that the decay curves follow. I'll be only including trial 9999 in this screenshot from the terminal window since I'm sure you don't want to see all 9999.

```
23      2           1         1          1.25              98.75             0.5000
24      1           1         0          1.25              98.75             0.0000
25      1           1         0          1.25              98.75             0.0000
26      1           0         1          0.00              100.00            1.0000

=== Trial 9999 (1-5 (Parent) / 6 (Daughter)) ===
Roll(s) Dice Left   Parents   Daughters   % Parents Left    % Daughters Left    Prob (decay)
0       80          80        0          100.00            0.00                0.0000
-------------------------------------------------------------------------------------------
1       80          67        13         83.75             16.25               0.1625
2       67          58        9          72.50             27.50               0.1343
3       58          52        6          65.00             35.00               0.1034
4       52          41        11         51.25             48.75               0.2115
5       41          35        6          43.75             56.25               0.1463
6       35          29        6          36.25             63.75               0.1714
7       29          23        6          28.75             71.25               0.2069
8       23          16        7          20.00             80.00               0.3043
9       16          13        3          16.25             83.75               0.1875
10      13          8         5          10.00             90.00               0.3846
11      8           5         3          6.25              93.75               0.3750
12      5           5         0          6.25              93.75               0.0000
13      5           2         3          2.50              97.50               0.6000
14      2           2         0          2.50              97.50               0.0000
15      2           2         0          2.50              97.50               0.0000
16      2           2         0          2.50              97.50               0.0000
17      2           1         1          1.25              98.75               0.5000
18      1           1         0          1.25              98.75               0.0000
19      1           1         0          1.25              98.75               0.0000
20      1           0         1          0.00              100.00              1.0000
```

Then this is the outputted graph showing that Average, Median, Max and Min decays curves as well as the 14 random trials:



Hopefully this helps illustrate the potential for this program! Have fun, don't hesitate to open an issue thread if something comes across, that you think should be there or bugs, or whatever.