

An Assessed Exercise Taster

To demonstrate your understanding of the course material so far, reproduce the Excel worksheet overleaf as closely as you can but with the missing values supplied. The only other differences should be the use of your own name and the current date. The problem for which the worksheet is a solution is described below...

The Greenfly Problem

Greenfly can reproduce asexually. After one week of life a female can produce eight offspring a day. Starting at the beginning of day 1 with a single mature female, how many greenfly could there be by day 28?

It may be assumed that there are no deaths and that all offspring are females which, in turn, start reproducing on day 8 of their lives.

The Solution

The worksheet represents a kind of daily inventory. Columns headed N1 to N7 show the numbers of greenfly which are in their first day of life, second day of life, and so on up to those in their seventh day of life.

For these immature greenfly, the general rule is that $N_{n+1,d+1} = N_{n,d}$ where $N_{n,d}$ is the number of greenfly in their n th day of life on day d . The special case is that, from day 1 onwards, $N_{1,d} = 8 * M_d$ where M_d is the number of mature greenfly on day d .

The first two columns show the day number and the total number of greenfly. These two columns were selected prior to creating an embedded chart (from the Charts group on the Insert tab), which takes the form of a log plot.

There is no legend and no title. There are no tick marks on the vertical axis. Every seventh tick mark on the horizontal axis crosses that axis and has a label in 12-point font. The other tick marks do not cross the axis. All text on the chart is in 12-point font.

Print out the worksheet and show the hard-copy to a demonstrator.

SOLUTION TO THE GREENFLY PROBLEM – A.B. Smith, Churchill College

21 October 2013

Day	Total	N1	N2	N3	N4	N5	N6	N7	Mature
0	1	0	0	0	0	0	0	0	1
1	9	8	0	0	0	0	0	0	1
2	17	8	8	0	0	0	0	0	1
3	25	8	8	8	0	0	0	0	1
4	33	8	8	8	8	0	0	0	1
5	41	8	8	8	8	8	0	0	1
6	49	8	8	8	8	8	8	0	1
7	57	8	8	8	8	8	8	8	1
8	129	72	8	8	8	8	8	8	9
9	265	136	72	8	8	8	8	8	17
10	465	200	136	72	8	8	8	8	25
11	729	264	200	136	72	8	8	8	33
12	1057	328	264	200	136	72	8	8	41
13	1449	392	328	264	200	136	72	8	49
14	1905	456	392	328	264	200	136	72	57
15	2937	1032	456	392	328	264	200	136	129
16	5057	2120	1032	456	392	328	264	200	265
17	8777	3720	2120	1032	456	392	328	264	465
18	14609	5832	3720	2120	1032	456	392	328	729
19	23065	8456	5832	3720	2120	1032	456	392	1057
20	34657	11592	8456	5832	3720	2120	1032	456	1449
21	49897	15240	11592	8456	5832	3720	2120	1032	1905
22	73393	23496	15240	11592	8456	5832	3720	2120	2937
23	113849	40456	23496	15240	11592	8456	5832	3720	5057
24	184065	...	...	...	...	...	...	...	...
25	300937	...	...	...	...	...	...	...	...
26	485457	...	...	...	...	...	...	...	...
27	762713	...	...	...	...	...	...	...	...
28	1161889	...	...	...	...	...	...	...	...

