Part Replacement:
A Dynamic Simulation Model

Your factory's production equipment contains a belt that must operate under extreme environmental conditions. The belts fail frequently, and the exact probability of failure depends on a belt's age, as follows:

Day of Use	Chance of Belt Failure
1	3%
2	7%
3	12%
4	20%
5	34%
6 or more	40%

If a belt fails while in use, it must be replaced on an emergency basis. This causes you to lose the remainder of the day's production on the equipment, with a cost uniformly distributed between $1,000 and $2,000. In this case, you start the next day with a fresh belt.

A working belt can also be replaced just before the start of any day's production. This scheduled replacement is much cheaper than emergency replacement, costing only $450, and allows you to start that day with a fresh belt.

The firm's strategy is to replace each belt after *n* days of use, or as soon as it fails, whichever comes first. What is the best choice of *n* out of the possibilities 1, 2, 3, 4, 5, and 6? Simulate each policy for 100 days with a sample size of 500. Assume that you start the 100-day period with a scheduled replacement.

For the best policy, what is the average number of scheduled and emergency replacements in the 100-day period?