1. Suppose you play the game of shooting. You shoot 6 times, each time to a different enemy, and each shot has a 10% chance of success.

1) What's the probability of killing two enemies out of six?

2) What's the probability of killing at most three enemies out of six?

3) What's the maximum number of enemies we can kill with 90% probability?

2. Suppose there is only one enemy and two success shots can kill the enemy. Each shot has a 10% chance of success. How many times do you need to shoot to kill the enemy with 80% probability?

P(X = k) = C(n , k) \* (p ^k) \* (q ^(n-k))

C(n , k) = n! / (k! \* (n – k)!)

p = probability of success

q = probability of failure

n = total number of trials

k = number of successful trials we want

**1.1)**

P(X = 2) = C(6,2) \* (0.1^2)\*(0.9^(6-2))

C(6,2) = 6! / (2! \* (6-2)!) = 15

(0.1^2) = 0.01

(0.9^(6-2)) = 0.6561

15 \* 0.01 \* 0.6561 = 0.098415

0.0984 = 9.84%

9.84%

**1.2)**

P(X = 0) = C(6,0) \* (0.1^0)\*(0.9^(6-0))

C(6,0) = 6! / (0! \* (6-0)!) = 1

(0.1^0) = 1

(0.9^(6-0)) = 0. 531441

1\* 1 \* 0.531441 = 0.531441

0. 531441= 53.1441%

P(X = 1) = C(6,1) \* (0.1^1)\*(0.9^(6-1))

C(6,1) = 6! / (1! \* (6-1)!) = 6

(0.1^1) = 0.1

(0.9^(6-1)) = 0.59049

6 \* 0.1 \* 0. 59049 = 0.354294

0. 01458= 35.4294%

P(X = 2) = C(6,2) \* (0.1^2)\*(0.9^(6-2))

C(6,2) = 6! / (2! \* (6-2)!) = 15

(0.1^2) = 0.01

(0.9^(6-2)) = 0.6561

15 \* 0.01 \* 0.6561 = 0.098415

0.0984 = 9.8415%

P(X = 3) = C(6,3) \* (0.1^3)\*(0.9^(6-3))

C(6,3) = 6! / (3! \* (6-3)!) = 20

(0.1^3) = 0.001

(0.9^(6-3)) = 0. 01458

20 \* 0.001 \* 0.729 = 0.01458

0. 01458= 1.458%

From what I have seen online, to kill at most 3 enemies, you add up all the probabilities. So

53.14% + 35.42% + 9.84% + 1.45% = 99.873%

BUT 53.14% is for killing 0 enemies, which means its 35.42% + 9.84% + 1.45% = 46.71%

This does not seem right at all, but its what I found online seeing as there aren’t any notes to my knowledge. I also made a c++ program that inputs the success, failure, total attempts and successful attempts and it gives me the answers

A screenshot of a computer program

Description automatically generated

**1.3)**

P(X = k) = C(n , k) \* (p ^k) \* (q ^(n-k))

C(n , k) = n! / (k! \* (n – k)!)

90%(X = k) = C(6, k) \*(0.1^k)\*(0.9^(6-k))

C(6,k) = 6! / (k! \* (6-k)!) = ?

As seen from when I calculated C(X = 1) to C(X=3),

(K = 1) = 35% is the most we can get? This number will decline as we increase K, meaning there is no amount of enemies we can kill with a 90% probability.

0 enemies

**2)**

(Prob of 1 hit) – (prob of 0 hits)

(0.1 \* 0.9^x-1 \* x) – (0.9^x) = 0.8

N = 2

C(n,k) = C(2,2) = 1

(p^k) = (0.1^2) = 0.01

(q^(n-k)) = (0.9^(2-2) = 1

1 \* 0.01 \* 1 = 0.01

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Result: 1%

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N = 3

C(n,k) = C(3,2) = 3

(p^k) = (0.1^2) = 0.01

(q^(n-k)) = (0.9^(3-2) = 0.9

3 \* 0.01 \* 0.9 = 0.027

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Result: 2.7%

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N = 4

C(n,k) = C(4,2) = 6

(p^k) = (0.1^2) = 0.01

(q^(n-k)) = (0.9^(4-2) = 0.81

6 \* 0.01 \* 0.81 = 0.0486

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Result: 4.86%

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N = 5

C(n,k) = C(5,2) = 10

(p^k) = (0.1^2) = 0.01

(q^(n-k)) = (0.9^(5-2) = 0.729

10 \* 0.01 \* 0.729 = 0.0729

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Result: 7.29%

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N = 6

C(n,k) = C(6,2) = 15

(p^k) = (0.1^2) = 0.01

(q^(n-k)) = (0.9^(6-2) = 0.6561

15 \* 0.01 \* 0.6561 = 0.098415

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Result: 9.8415%

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N = 7

C(n,k) = C(7,2) = 21

(p^k) = (0.1^2) = 0.01

(q^(n-k)) = (0.9^(7-2) = 0.59049

21 \* 0.01 \* 0.59049 = 0.124003

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Result: 12.4003%

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N = 8

C(n,k) = C(8,2) = 28

(p^k) = (0.1^2) = 0.01

(q^(n-k)) = (0.9^(8-2) = 0.531441

28 \* 0.01 \* 0.531441 = 0.148803

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Result: 14.8803%

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N = 9

C(n,k) = C(9,2) = 36

(p^k) = (0.1^2) = 0.01

(q^(n-k)) = (0.9^(9-2) = 0.478297

36 \* 0.01 \* 0.478297 = 0.172187

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Result: 17.2187%

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N = 10

C(n,k) = C(10,2) = 45

(p^k) = (0.1^2) = 0.01

(q^(n-k)) = (0.9^(10-2) = 0.430467

45 \* 0.01 \* 0.430467 = 0.19371

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Result: 19.371%

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Add them all up and get 89% so 10 enemies