

Q3).

Probability of surviving first bullet= $(x-t)/x$

Probability of surviving second bullet= $(x-t-1)/x-1$

Total prob= $(x-t)(x-t-1)/x(x-1)$

For probability to be approx 50%:

$0.5 = (x-t)(x-t-1)/x(x-1)$

Let $k = x-t$

$0.5 = k(k-1)/x(x-1)$

$x^2 - x = 2k^2 - 2k$

$k = (1 + \sqrt{1 + 2x^2 - 2x})/2$

By running the following code in C for values of x from 1 to 30 to check for a near integer value of k we get the value:

```
#include<stdio.h>
#include<math.h>
int main() {
    float x, t, k;
    for (x = 0; x < 30; x++) {
        k = (1 + sqrt(1 + 2 * x * x - 2 * x)) / 2;
        printf("%f %f\n", k, x);
    }
}
```

$k=3, x=4$ so $x=4, t=1$ is the lowest no of barrel

$k=10, x=14$ so $x=14, t=4$ is the second lowest no of barrel