The following BASIC code generates 10,000 values of a random variable X and calculates the sample average, the sample variance, and the fraction of sample values that lie in the interval $(a, b]$. Adapt this simulation program to:
1. Calculate the values needed to fill in the table for $E(X)$, $V(X)$ and $P(a < X \leq b)$, where $a=0.9$ and $b=1.8$. Show all theoretical calculations.
2. For each case, on a separate page, draw the graph of the theoretical distribution function $F_x(t)$, fill in the table describing $F_x(t)$, and plot the simulation values given in the table on the same graph as the theoretical distribution function.

```
RANDOMIZE
100 INPUT a,b
200 FOR i = 1 TO 10000

generate X

300 S1 = S1 + X
400 S2 = S2 + X^2
500 IF (X > a) AND (X <= b) THEN c = c + 1
600 NEXT i
700 PRINT S1/10000, S2/10000 -(S1/10000)^2, c/10000
```

| | | E(X) | | V(X) | | $P(a < X \leq b)$ | |
Case	X	theory	simulation	theory	simulation	theory	simulation
1	$X \sim U(0,1)$						
2	$X \sim exp\,(2)$						
3	$P(X=1/2) = 1$						
4	$P(X=0.3) = 0.8$ $P(X=1.3) = 0.2$						

Distribution Function $F_x(t)$

| | 1 | | 2 | | 3 | | 4 | |
t	theory	simulation	theory	simulation	theory	simulation	theory	simulation
-0.25								
0.00								
0.25								
0.50								
0.75								
1.00								
1.25								
1.50								