

## Activity # 4

Question # 1

$$r_0 = 8697$$

$$r_n = (229 r_{n-1}) \bmod 349, n \geq 0$$

(a)

$$r_1 = (229 r_0) \bmod 349$$

$$r_1 = (229 \times 8697) \bmod 349$$

$$r_1 = (1991613) \bmod 349$$

$$\boxed{r_1 = 219}$$

$$r_2 = (229 r_1) \bmod 349$$

$$= (229 \times 219) \bmod 349$$

$$\boxed{r_2 = 244}$$

$$r_3 = (229 \times r_2) \bmod 349$$

$$r_3 = (229 \times 244) \bmod 349$$

$$\boxed{r_3 = 36}$$

(b)

$$n_1 = \frac{219}{349} = 0.6275$$

$$n_2 = \frac{244}{349} = 0.6991$$

$$n_3 = \frac{36}{349} = 0.1031$$

(c)

maximum number is 348

Question # 2

$$r_0 = 1021$$

$$r_n = (467 r_{n-1}) \bmod 1024, n > 0$$

$$r_1 = (467 \times r_0) \bmod 1024$$

$$= (467 \times 1021) \bmod 1024$$

$$\boxed{r_1 = 647}$$

$$r_2 = (467 \times 647) \bmod 1024$$

$$\boxed{r_2 = 69}$$

$$r_3 = (467 \times 69) \bmod 1024$$

$$r_3 = 479$$

$$n_1 = \frac{647}{1024} = 0.6318$$

$$n_2 = \frac{69}{1024} = 0.0673$$

$$n_3 = \frac{479}{1024} = 0.4677$$

maximum number is 1023

### Question # 3

(a)

$$6.0 \leq \text{INT}((26.0 - 6.0 + 1) \text{rand} + 6.0) \\ < 26.0$$

(b)

$$35.8 \leq \text{INT}((73.4 - 35.8 + 1) \text{rand} \\ + 35.8) < 73.4$$

(c)

$$b = \text{INT}((26 - 6 + 1) \text{rand} + 6) \\ < 26.$$

(d)

$$35 < \text{INT}((73 - 35 + 1) \text{rand} + 35) \\ < 73$$

Question # 4

(a) Prob of  $N = 0.12$

(b) Prob of  $E = 0.26 - 0.12 \\ = 0.14$

(c) Prob of  $S = 0.69 - 0.26 \\ = 0.43$

(d) Prob of  $W = 1 - 0.69 \\ = 0.31$

## Question # 5

(a)

The probability density function is exponential.

(b)

$$r = 0.1$$

$$\text{rand} = 0.754$$

$$= \ln(\text{rand}) / r$$

$$= \ln(0.754) / 0.1$$

$$= \frac{-0.2823}{0.1}$$

$$= -2.823$$

# Question # 6

$$M = 70$$

$$a = 5.32$$

$$\sigma = 8$$

$$rand = 0.754$$

formula  $b \sin(a) + M$   
 $b \cos(a) + M$

$a = a$  uniform number  
in  $[0, 2\pi]$

(a)

$$a = 5.32$$

(b)

$$b = \sigma \sqrt{-2 \ln(\text{rand})}$$

$$= 8 \sqrt{-2 \ln(0.754)}$$

$$= 8 \sqrt{-2(-0.2823)}$$

$$= 8 \sqrt{0.5647}$$

$$= 8(0.7514) = 6.0119$$

(c)

$$\begin{aligned} & b \sin(\alpha) + H \\ &= 6.0117 \sin(53.32^\circ) + 70 \\ &= 6.0117 (0.8210) + 70 \\ &= -4.9356 + 70 \\ &= 65.0643 \end{aligned}$$

(d)

$$\begin{aligned} & b \cos(\alpha) + H \\ &= 6.0117 (0.5702) + 70 \\ &= 3.4317 + 70 \\ &= 73.4317 \end{aligned}$$