

HW6  
Adrian Law

1.

- a. RMS:  $(C_i / T_i) \leq N(2^{(1/N)} - 1)$   
 $(1 / T_i) + 0.2 + 0.3333 = 3(2^{(1/3)} - 1)$   
 $T_i = 4.058$

b.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
T1	X				DX				DX				DX				DX		
T2		X				DX				DX						DX			
T3			X	X			D X	X					D	X	X				D

- c. EDF:  $(C_i / T_i) \leq 1$   
 $(1 / T_i) + 0.2 + 0.3333 = 1$   
 $T_i = 2.1429$

d.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
T1	1		D .9	D .1	D .8	.2	D .7	.3	D .6	.4	D	1	D .4	.6	D .3	.7	D		
T2		1				D	.3	.7			D		.6	.4		D			
T3			.1	.9	.2	.8	D		.4	.6	1		D		.7	.3	1		D

2.

- a. Assuming turn = 0 at start

P0  Flag[0] = True; If(flag[1]){ If(turn == 1){} ← False } Enters CS	P1 Flag[1] = True; If(flag[0]){} ← False Enters CS
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b. Process  $P_i$ :

```
Repeat:
    flag[i]:=true;
    while(flag[j]){
        if (turn==j) {
            flag[i]:=false;
            while (turn==j) {};
            flag[0]:=true;
        }
    }
    Critical Section
    turn:=j;
    flag[i]:=false;
    Remainder Section
Forever
```

3.

a. See code myProcess

```
0 - Starting iteration 1
0 - We hold these truths to be self-evident, that all men are created equal,
1 - Starting iteration 1
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 1
0 - Done iteration 1
1 - Starting iteration 2
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 2
0 - Starting iteration 2
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 2
0 - Starting iteration 3
1 - Starting iteration 3
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 3
1 - Done iteration 3
1 - Starting iteration 4
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 4
0 - Starting iteration 4
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 4
```

```

1 - Starting iteration 5
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 5
0 - Starting iteration 5
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 5

```

## b. See code myProcessDekker (Fairness = 0)

```

0 start entry protocol
1 start entry protocol
0 - Starting iteration 1
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 1
1 - Starting iteration 1
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 1
0 start entry protocol
0 - Starting iteration 2
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 2
1 start entry protocol
1 - Starting iteration 2
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 2
0 start entry protocol
0 - Starting iteration 3
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 3
0 start entry protocol
0 - Starting iteration 4
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 4
1 start entry protocol
1 - Starting iteration 3
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 3
0 start entry protocol
0 - Starting iteration 5
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 5
1 start entry protocol
1 - Starting iteration 4
1 - We hold these truths to be self-evident, that all men are created equal,

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```

1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 4
1 start entry protocol
1 - Starting iteration 5
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 5

```

c. See code myProcessDekker (fairness = 1)

```

0 start entry protocol
1 start entry protocol
1 - Starting iteration 1
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 1
1 start entry protocol
1 - Starting iteration 2
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 2
1 start entry protocol
1 - Starting iteration 3
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 3
1 start entry protocol
1 - Starting iteration 4
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 4
1 start entry protocol
1 - Starting iteration 5
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 5
0 - Starting iteration 1
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 1
0 start entry protocol
0 - Starting iteration 2
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 2
0 start entry protocol
0 - Starting iteration 3
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 3
0 start entry protocol
0 - Starting iteration 4
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,

```

```

0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 4
0 start entry protocol
0 - Starting iteration 5
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 5

```

d. See code myProcessPeterson (fairness = 1)

```

1 start entry protocol
1 - Starting iteration 1
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 1
1 start entry protocol
1 - Starting iteration 2
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 2
1 start entry protocol
1 - Starting iteration 3
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 3
1 start entry protocol
1 - Starting iteration 4
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 4
1 start entry protocol
1 - Starting iteration 5
1 - We hold these truths to be self-evident, that all men are created equal,
1 - that they are endowed by their Creator with certain unalienable Rights,
1 - that among these are Life, Liberty and the pursuit of Happiness.
1 - Done iteration 5
0 start entry protocol
0 - Starting iteration 1
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 1
0 start entry protocol
0 - Starting iteration 2
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 2
0 start entry protocol
0 - Starting iteration 3
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.
0 - Done iteration 3
0 start entry protocol
0 - Starting iteration 4
0 - We hold these truths to be self-evident, that all men are created equal,
0 - that they are endowed by their Creator with certain unalienable Rights,
0 - that among these are Life, Liberty and the pursuit of Happiness.

```

0 - Done iteration 4  
0 start entry protocol  
0 - Starting iteration 5  
0 - We hold these truths to be self-evident, that all men are created equal,  
0 - that they are endowed by their Creator with certain unalienable Rights,  
0 - that among these are Life, Liberty and the pursuit of Happiness.  
0 - Done iteration 5

4.  $N = 70$ , Standard Deviation = 116342.447, Mean = 103058  
 $Z = 1.96$

$$E = 1.96 * (116342.447 / 70^{.5})$$
$$E = 27254.9$$

$103058 \pm 27254.9 = 95\%$  CI of the number of busy waiting loops

This value is undercounted as the time it takes to increment a counter is slightly more than simply executing an empty while loop, thus the true mean should be above this confidence interval