ASSIGNMENT #1 (15 marks)

Question 1 (6 marks)

(a) **(3 marks)**

N	I/YR	PV	PMT	FV
30	4	300,000	= 17,349.03	

(b) **(3 marks)**

Since the last payment is made on the 60th birthday (his/her 26th payment), we need to first calculate the FV [at the end of the 26th year or his/her 61st birthday (35 + 26 = 61)].

NOTE: Since payments are made at the beginning of the year, the 60th birthday payment would take us to the "end" of that year or his/her 61st birthday (four years before retirement date- his/her 65th birthday).

Future Value (at 61st birthday) = $250,000 \div 1.06^4 = 198,023.42$

OR

N	I/YR	PV	PMT	FV
4	7	= 190,723.80		250,000

BEG ON

N	I/YR	PV	PMT	FV
26	7		= 2,595.45	190,723.80

ALTERNATE APPROACH:

1. Calculate present value (today) of 250,000.

N	I/YR	PV	PMT	FV
30	7	= 32,841.78		250,000

2. Calculate payments needed to equal this present value by 61st birthday (26 payments).

BEG ON

N	I/YR	PV	PMT	FV
26	7	32,841.78	= 2,595.45	

ALTERNATE APPROACH **(end-of-period payments)**:

Since payments begin on his/her 35th birthday, one can consider them to be end-of-period payments starting on his 34th birthday (instead of beginning-of-period payments starting on his 35th birthday). In order to use end-of-period payments, one would have to calculate the PV at the 34th birthday and then calculate the end-of-period payments up to his/her 60th birthday.

1. Calculate present value (today) of 250,000.

N	I/YR	PV	PMT	FV
31	7	= 30,693.25		250,000

2. Calculate payments needed to equal this present value by 60th birthday (26 payments).

N	I/YR	PV	PMT	FV
26	7	30,693.25	= 2,595.45	

ALTERNATE APPROACH (end-of-period payments):

Future Value (at 60th birthday) = $250,000 \div 1.07^5 = 178,246.54$

OR

N	I/YR	PV	PMT	FV
5	7	= 178,246.54		250,000

N	I/YR	PV	PMT	FV
26	7		= 2,595.45	178,246.54

Question 2 (9 marks)

(a) **(6 marks)**

STEP 1:

Calculate present value at date of Luke's death (at 75) of Laura's $5,000 till she dies.

BEG ON EAR = $(1.06)^2 - 1 = .1236$

N	I/YR	PV	PMT	FV
10	12.36	= 31,280.59	5,000	

STEP 2:

Calculate present value (at retirement) of Luke and Laura's $10,000 and present value (at retirement) of Laura's $31,280.59.

BEG ON

N	I/YR	PV	PMT	FV
10	10	= 79,650.26	10,000	31,280.59

ALTERNATE APPROACH (STEP 1 AND STEP 2):

STEP 1:

Calculate present value (at retirement) of Luke's 5,000 for 10 years.

BEG ON

N	I/YR	PV	PMT	FV
10	10	= 33,795.12	5,000	

STEP 2:

Calculate present value (at 75) of Laura's 5,000 for 10 years.

BEG ON

N	I/YR	PV	PMT	FV
10	12.36	= 31,280.59	5,000	

Calculate present value (at retirement) of Laura's 5,000 for 10 years and present value (at retirement) of Laura's $31,280.59 (at Luke's death).

BEG ON

N	I/YR	PV	PMT	FV
10	10	= 45,855.14	5,000	31,280.59

Total needed for Luke and Laura = 33,795.12 + 45,855.14 = 79,650.26

STEP 3:

Calculate the monthly payments required to accumulate 79,650.26 by retirement.

Effective monthly rate = $(1.09)^{1/12} - 1 = .007207$

Number of monthly payments = 35 x 12 = 420

BEG OFF

N	I/YR	PV	PMT	FV
420	.7207		= 29.57	79,650.26

(b) **(3 marks)**
Thus, they will apply 5,000 [40,000 – 10,000 – 25,000] towards their retirement 5 years from now.

Future value of 5,000 at retirement =

N	I/YR	PV	PMT	FV
360	.7207	5,000		= 66,330.73

OR

N	I/YR	PV	PMT	FV
30	9	5,000		= 66,338.39

The $66,330.73 can go towards the $79,650.26 that they need for retirement. Thus, their savings for retirement only need to generate $13,319.53 [79,650.26 – 66,330.73] or $13,311.87 [79,650.26 – 66,338.39].

Thus, the monthly payments required to accumulate 12,551.09 by retirement =

N	I/YR	PV	PMT	FV
420	.7207		= 4.87 or = 4.94	13,319.53 or 13,311.87

ALTERNATE PRESENT VALUE APPROACH:
Calculate PV today of amount needed at retirement:

N	I/YR	PV	PMT	FV
420 or 35	.7207 or 9	= 3,902.28 or = 3,901.75		79,650.26

Calculate PV today of savings for inheritance:

N	I/YR	PV	PMT	FV
60 or 5	.7207 or 9	= 3,249.72 or = 3,249.66		5,000

Thus, 3,249.72 can go towards 3,902.28, leaving 652.56 [or 652.09] to be made up by savings.

N	I/YR	PV	PMT	FV
420	.7207	652.56 or 652.09	= 4.94	

OR

N	I/YR	PV	PMT	FV
420	.7207	-3,249.72	= 4.95	79,650.26