Q1

i	6%	/yr-yr
m	6	yrs

	Design A	Design B	Design C
First cost	100000	150000	225000
Economic Lf	3	6	9
SV	0	10000	25000
OC/yr	25000	10000	5000
Maint./yr	15000	7500	6000

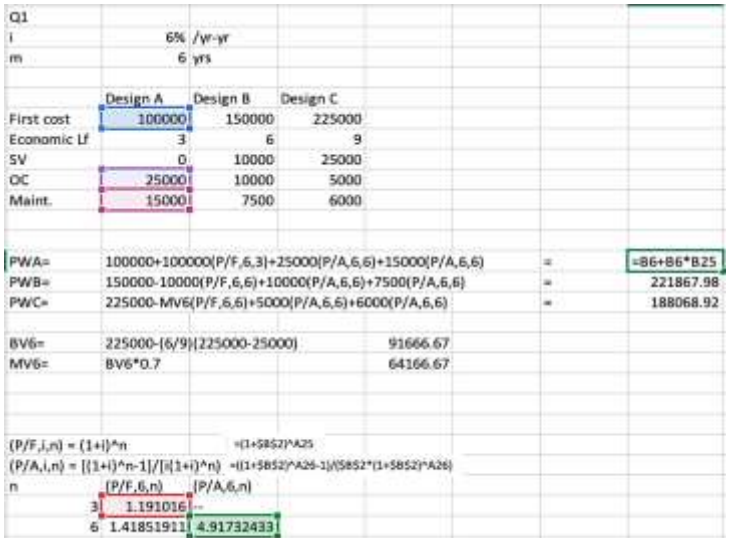
PWA=	100000+100000(P/F,6,3)+25000(P/A,6,6)+15000(P/A,6,6)	=	380654.90
PWB=	150000-10000(P/F,6,6)+10000(P/A,6,6)+7500(P/A,6,6)	=	**229003.57**
PWC=	225000-MV6(P/F,6,6)+5000(P/A,6,6)+6000(P/A,6,6)	=	233855.60

BV6=	225000-(6/9)(225000-25000)	91666.67
MV6=	BV6*0.7	64166.67

(P/F,i,n) = (1+i)^(-n) =(1+$B$2)^A25

(P/A,i,n) = [(1+i)^n-1]/[i(1+i)^n] =((1+$B$2)^A26-1)/($B$2*(1+$B$2)^A26)

n	(P/F,6,n)	(P/A,6,n)
3	0.83961928	--
6	0.70496054	4.91732433



Sensitivity Analysis- determines the effect on the PW based on input variables

Cost-wise, choose Design B.

Sensitivity: Design C may be a better choice because OC and Maint. Costs per year may not stay constant (may inflate, for example). In that case, Design C triumps because it has lower OC and Maint at t=0 and would therefore increase less. Other observations is that the first cost of Design C is higher, but it is still the second best option. Additionally, it is also more advantageous because SV is higher and economic life is higher.

Design B, the selected design assumed MV6=BV6*0.7. It's not a guarantee that the market to book ratio would always be constant. Market value usually exponentially decreases while Book value is a linear regression. As a result, for the prediction to work, the market value has to be not radically decreasing in the future (t=6-9). How would you know if market value is not radically decreasing in that timeframe, well, that's probably another type of qualitative or quantitative analysis.

Q2

i	6%	/yr-yr
m	7	yrs

	Design X	Design Y
First cost	300000	500000
Economic Lf	7	7
SV	15000	50000
OC/yr	50000	25000
Maint./yr	25000	10000

EUACX= 300000(A/P,6,7)-15000(A/F,6,7)+[75000(P/F,6,1)+75000(P/F,6,2)+…+75000(P/F,6,7)]*(A/P,6,7) = 126953.48

EUACY= 500000(A/P,6,7)-50000(A/F,6,7)+[35000(P/F,6,1)+35000(P/F,6,2)+…+35000(P/F,6,7)]*(A/P,6,7) = 118610.76

Design X>Design Y

(P/F,i,n) = (1+i)^(-n)

(A/P,i,n) = [i(1+i)^n]/ [(1+i)^n-1]

(A/F,i,n) = i/[(1+i)^n-1]

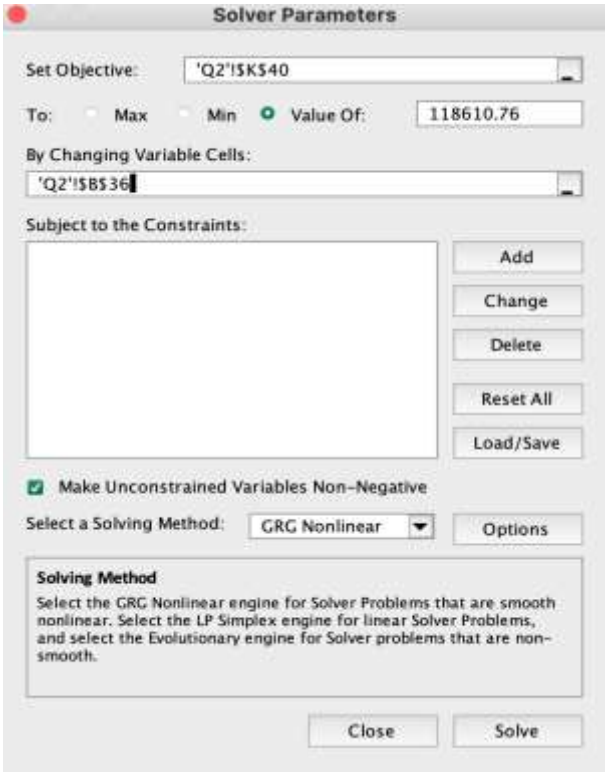
n	(P/F,6,n)	(A/P,6,n)	(A/F,6,n)
1	0.94339623	--	--
2	0.88999644	--	--
3	0.83961928	--	--
4	0.79209366	--	--
5	0.74725817	--	--
6	0.70496054	--	--
7	0.66505711	0.17913502	0.11913502

What causes break even to occur

	Design X	Design Y
First cost	300000	500000
Economic Lf	7	7
SV	15000	50000
OC/yr	**41657.2799**	25000
Maint./yr	25000	10000

EUACX= 300000(A/P,6,7)-15000(A/F,6,7)+[75000(P/F,6,1)+75000(P/F,6,2)+…+75000(P/F,6,7)]*(A/P,6,7) = 118610.76

EUACY= 500000(A/P,6,7)-50000(A/F,6,7)+[35000(P/F,6,1)+35000(P/F,6,2)+…+35000(P/F,6,7)]*(A/P,6,7) = 118610.76



Q3

Tax Rate	21%	
MARR	10%	
m	6	yrs

*parenthesis indicates a negative value (excel put it on its own, can't get rid of it)

n	Net Cash Flow	Deducted (B10:B16*$B$3)	Part a) Leftover	Part b)	Part c)
0	(20,000,000.00)	0.00	(20,000,000.00)	(20,000,000.00)	$ (22,000,000.00)
1	$ 8,000,000.00	$ 1,680,000.00	$ 6,320,000.00	$ 6,952,000.00	$ 5,688,000.00
2	$ 17,000,000.00	$ 3,570,000.00	$ 13,430,000.00	$ 14,773,000.00	$ 12,087,000.00
3	$ 19,000,000.00	$ 3,990,000.00	$ 15,010,000.00	$ 16,511,000.00	$ 13,509,000.00
4	$ 18,000,000.00	$ 3,780,000.00	$ 14,220,000.00	$ 15,642,000.00	$ 12,798,000.00
5	$ 10,000,000.00	$ 2,100,000.00	$ 7,900,000.00	$ 8,690,000.00	$ 7,110,000.00
6	$ 3,000,000.00	$ 630,000.00	$ 2,370,000.00	$ 2,607,000.00	$ 2,133,000.00

Part a)

IRR=IRR(D10:D16)	46%
IRR>MARR so, this product is worth marketing	

Part b)

higher by interest	10%
so	
Leftover*1.1	
IRR = IRR(E10:E16)	52%
How much of an increase from part a?	**6%**

Part c)

lower by interest	10%
so	
Leftover*0.9	
IRR = IRR(F10:F16)	35%
How much of a decrease from part a?	**-11%**

Q4

Tax Rate	21%		
MARR part a)	10%	part b)	20%
Economic lf	6	yrs	
First Cost	85000		
SV @ t=4	30000		
Savings/yr (before tax operating costs)	32000		25280

Part a)
(P/F,i,n) = (1+i)^(-n)

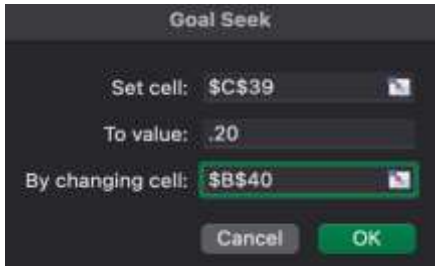
n	(P/F,6,n)		Cash Flow	Part a) Net Cash Flow
0	1	First Cost	$ (85,000.00)	$ (85,000.00)
1	0.909090909		$ 32,000.00	$ 25,280.00
2	0.826446281		$ 32,000.00	$ 25,280.00
3	0.751314801		$ 32,000.00	$ 25,280.00
4	0.683013455	Salvaged + bought again (B7+B6-FirstCost; B6 and B7 taxed)	$ (23,000.00)	$ (23,000.00)
5	0.620921323		$ 32,000.00	$ 25,280.00
6	0.56447393	Salvaged BV (P-D*2) + Saving	$ 89,500.00	$ 70,705.00

Straight Line Depreciation: D=(First Cost-SV)/n= 13750 /yr (set n=4)

At yr 6, salvaged 2 years early, so used 85000-D*2

Part a)
IRR = IRR(F19:F25) 16%
IRR>MARR so this product is worth marketing/acceptable

n	(P/F,6,n)		Cash Flow	Part b) After Tax
0	1	First Cost	$ (85,000.00)	$ (85,000.00)
1	0.909090909	Savings	$ 35,295.82	$ 27,883.70
2	0.826446281	Savings	$ 35,295.82	$ 27,883.70
3	0.751314801	Savings	$ 35,295.82	$ 27,883.70
4	0.683013455	Savings+ Salvaged + bought again	$ (19,704.18)	$ (19,704.18)
5	0.620921323	Savings	$ 35,295.82	$ 27,883.70
6	0.56447393	Salvaged + Saving	$ 92,795.82	$ 73,308.70



Part b)
IRR = IRR(G36:G42) 20% Objective: IRR = MARR

Savings/yr (before tax operating costs)	**35295.82**

Q5

Tax rate	21%	
MARR	10%	
Economic lf	6	yrs

First Cost	600000	
OC/yr= 300000*12	3600000	
SV (t=6)	100000	
Sales/copy = selling price-retailer cost=0.25-0.05=		0.20
Variable cost/copy = ink paper cost-ad revenue = 0.10-0.05=		0.05

25 weekdays in a month

How many copies per day must be sold to break even?
Break even: IRR=MARR
Let n = # of copies/day

Straight Line Depreciation: D=(First Cost-SV)/n= 50000.00 /yr
(set n = 10)

Revenue/copy = sales-variable cost		0.15
Revenue/yr = 25 active days/month*12 months/yr*(Revenue/copy)*n copies/day		3816433.49
n (copies/day)=	**84810**	

n	Cash Flow	NCF (after tax)	
0	-600000	-600000	
1	216433.4897	170982.4569	
2	216433.4897	170982.4569	
3	216433.4897	170982.4569	
4	216433.4897	170982.4569	
5	216433.4897	170982.4569	
6	-83566.51028	-83566.51028	Salvaged BV (P-D*6) + Rev -OC-FirstCost
	summation	171345.7741	

IRR 10% Note: Apparently IRR is not affected by depreciation so although it was calculated in this problem, it is never really used in NCF (after tax) except in the calculation of BV at t=6 where the press machine is salvaged early by 4 years