IE2111 ISE Principles & Practice II
Solutions to Assignment #5

After-tax *MARR* = 8%.
3-year capital allowance claim.

(*a*) Study period = 6 years.

Assume that Alternative *A* is co-terminated at EoY 6
After-tax Cash Flow Analysis for Alternative *A* over 6 years:

	(a)	(b)	(c) = (a) - (b)	(d) = -t (c)	(e)=(a) + (d)	(f)=(e}/(1+i)^k
EoY	BTCF	Depreciation	Taxable Income	Income Tax CF	ATCF	PW of ATCF
0	-1,800,000				-1,800,000.00	-1,800,000.00
1	420,000	600,000.00	-180,000.00	30,600.00	450,600.00	417,222.22
2	420,000	600,000.00	-180,000.00	30,600.00	450,600.00	386,316.87
3	420,000	600,000.00	-180,000.00	30,600.00	450,600.00	357,700.81
4	420,000		420,000.00	-71,400.00	348,600.00	256,231.41
5	420,000		420,000.00	-71,400.00	348,600.00	237,251.30
6	420,000		420,000.00	-71,400.00	348,600.00	219,677.13
6	450,000		450,000.00	-76,500.00	373,500.00	235,368.36
						309,768.10

$BV_6 = 0$

After-tax *PW*(8%) of Alternative *A* = **$ 309,768.10**
After-tax *AW*(8%) of Alternative *A* = $ 309,768.10 [*A*/*P*, 8%, 6] = $ 67,007.61

After-tax Cash Flow Analysis for Alternative *B* over 6 years:

	(a)	(b)	(c) = (a) - (b)	(d) = -t (c)	(e)=(a) + (d)	(f)=(e}/(1+i)^k
EoY	BTCF	Depreciation	Taxable Income	Income Tax CF	ATCF	PW of ATCF
0	-1,200,000				-1,200,000.00	-1,200,000.00
1	350,000	400,000.00	-50,000.00	8,500.00	358,500.00	331,944.44
2	350,000	400,000.00	-50,000.00	8,500.00	358,500.00	307,355.97
3	350,000	400,000.00	-50,000.00	8,500.00	358,500.00	284,588.86
4	350,000		350,000.00	-59,500.00	290,500.00	213,526.17
5	350,000		350,000.00	-59,500.00	290,500.00	197,709.42
6	350,000		350,000.00	-59,500.00	290,500.00	183,064.28
6	120,000		120,000.00	-20,400.00	99,600.00	62,764.89
						380,954.03

$BV_6 = 0$

After-tax *PW*(8%) of Alternative *B* = **$ 380,954.03**
After-tax *AW*(8%) of Alternative *B* = $ 380,954.03 [*A*/*P*, 8%, 6] = $ 82,406.22

Choose Alternative *B* which has a higher after-tax *PW*(8%) over 6 years.

(*b*) Study period = 9 years.

After-tax Cash Flow Analysis for Alternative *A* over 9 years:

	(a)	(b)	(c) = (a) - (b)	(d) = -t (c)	(e)=(a) + (d)	(f)=(e}/(1+i)^k
EoY	BTCF	Depreciation	Taxable Income	Income Tax CF	ATCF	PW of ATCF
0	-1,800,000				-1,800,000.00	-1,800,000.00
1	420,000	600,000.00	-180,000.00	30,600.00	450,600.00	417,222.22
2	420,000	600,000.00	-180,000.00	30,600.00	450,600.00	386,316.87
3	420,000	600,000.00	-180,000.00	30,600.00	450,600.00	357,700.81
4	420,000		420,000.00	-71,400.00	348,600.00	256,231.41
5	420,000		420,000.00	-71,400.00	348,600.00	237,251.30
6	420,000		420,000.00	-71,400.00	348,600.00	219,677.13
7	420,000		420,000.00	-71,400.00	348,600.00	203,404.75
8	420,000		420,000.00	-71,400.00	348,600.00	188,337.73
9	420,000		420,000.00	-71,400.00	348,600.00	174,386.79
9	180,000		180,000.00	-30,600.00	149,400.00	74,737.20
						715,266.21

$BV_9 = 0$

After-tax $PW(8\%)$ of Alternative *A* over 9 years = **$ 715,266.21**
After-tax $AW(8\%)$ of Alternative *A* over 9 years = $ 715,266.21 $[A/P, 8\%, 9]$ = $ 114,499.61

Assume Alternative *B* is repeated at EoY 6 and co-terminated at EoY 9.

After-tax Cash Flow Analysis for Alternative *B* over 9 years:

	(a)	(b)	(c) = (a) - (b)	(d) = -t (c)	(e)=(a) + (d)	(f)=(e}/(1+i)^k
EoY	BTCF	Depreciation	Taxable Income	Income Tax CF	ATCF	PW of ATCF
0	-1,200,000				-1,200,000.00	-1,200,000.00
1	350,000	400,000.00	-50,000.00	8,500.00	358,500.00	331,944.44
2	350,000	400,000.00	-50,000.00	8,500.00	358,500.00	307,355.97
3	350,000	400,000.00	-50,000.00	8,500.00	358,500.00	284,588.86
4	350,000		350,000.00	-59,500.00	290,500.00	213,526.17
5	350,000		350,000.00	-59,500.00	290,500.00	197,709.42
6	350,000		350,000.00	-59,500.00	290,500.00	183,064.28
6	120,000		120,000.00	-20,400.00	99,600.00	62,764.89
6	-1,200,000				-1,200,000.00	-756,203.55
7	350,000	400,000.00	-50,000.00	8,500.00	358,500.00	209,181.31
8	350,000	400,000.00	-50,000.00	8,500.00	358,500.00	193,686.40
9	350,000	400,000.00	-50,000.00	8,500.00	358,500.00	179,339.25
9	450,000		450,000.00	-76,500.00	373,500.00	186,842.99
						393,800.43

$BV_6 = 0$, $BV_3 = 0$

After-tax $PW(8\%)$ of Alternative *B* over 9 years = **$ 393,800.43**
After-tax $AW(8\%)$ of Alternative *B* over 9 years = $ 393,800.43 $[A/P, 8\%, 9]$ = $ 63,039.46

Choose Alternative A which has a higher after-tax PW(8%) over 9 years.