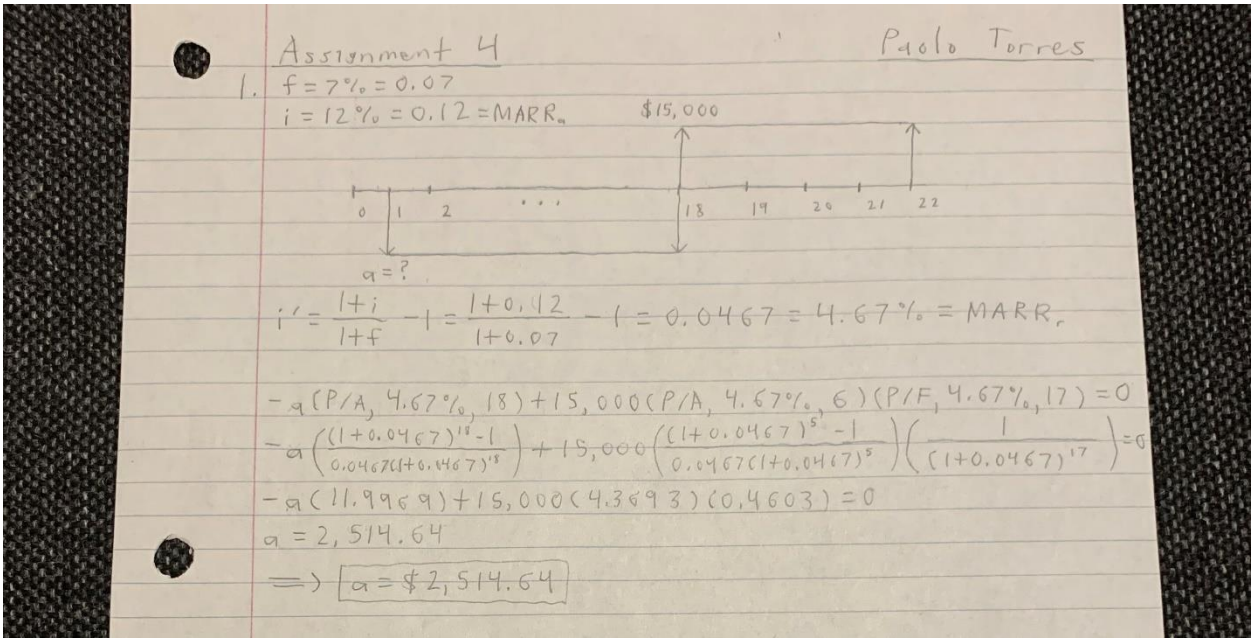
MSCI 261 – ASSIGNMENT 4

1 QUESTION 1



Assignment 4 — Paolo Torres

1. $f = 7\% = 0.07$

$i = 12\% = 0.12 = MARR_a$

$$i' = \frac{1+i}{1+f} - 1 = \frac{1+0.12}{1+0.07} - 1 = 0.0467 = 4.67\% = MARR_r$$

$$-a(P/A, 4.67\%, 18) + 15,000(P/A, 4.67\%, 6)(P/F, 4.67\%, 17) = 0$$

$$-a\left(\frac{(1+0.0467)^{18}-1}{0.0467(1+0.0467)^{18}}\right) + 15,000\left(\frac{(1+0.0467)^{6}-1}{0.0467(1+0.0467)^{6}}\right)\left(\frac{1}{(1+0.0467)^{17}}\right) = 0$$

$$-a(11.9969) + 15,000(4.3693)(0.4603) = 0$$

$$a = 2,514.64$$

$$\Rightarrow \boxed{a = \$2,514.64}$$

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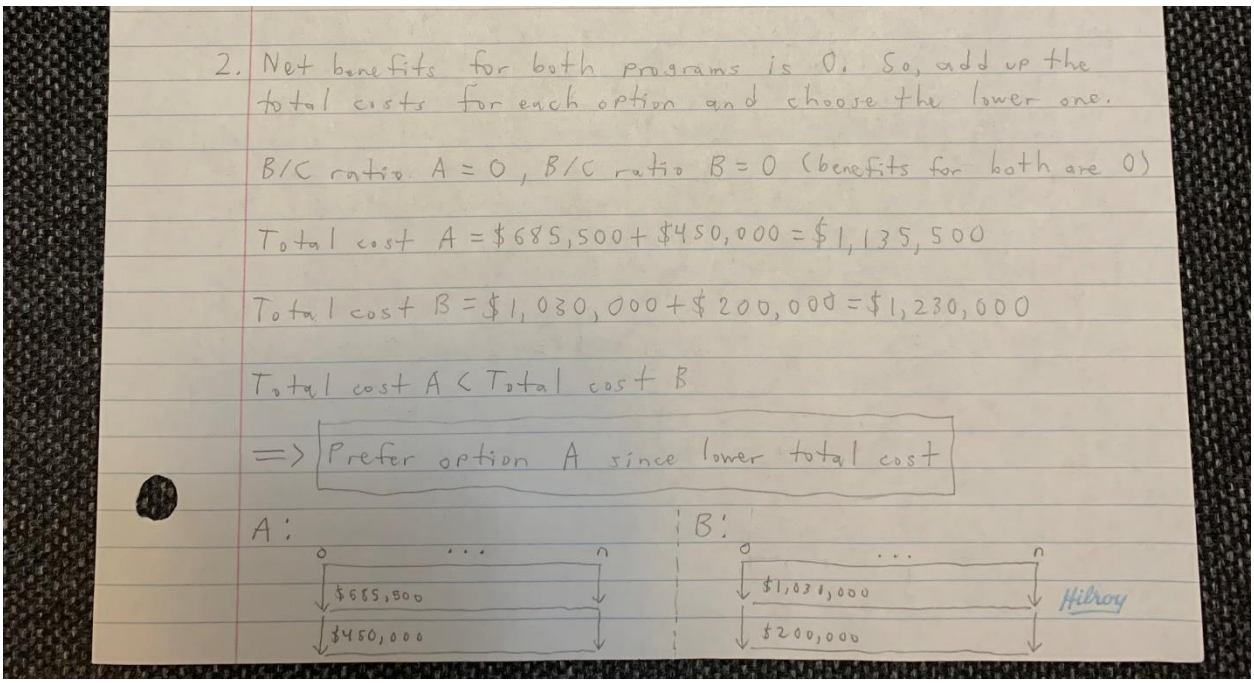
2 QUESTION 2



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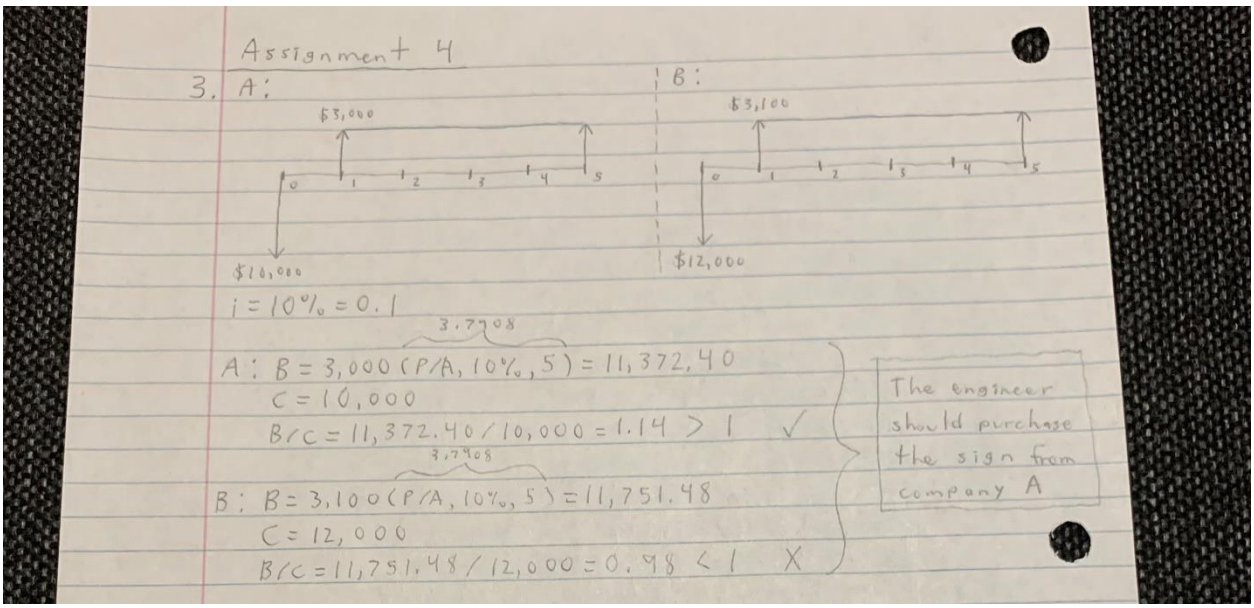
3 QUESTION 3



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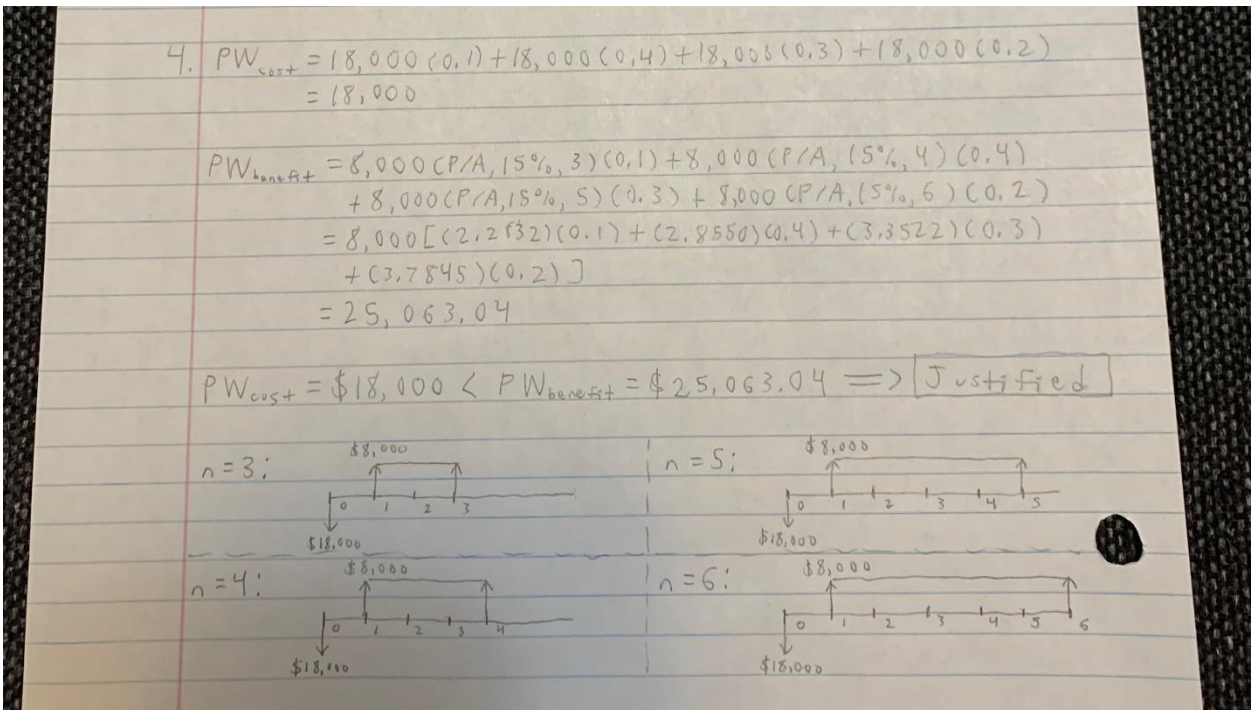
4 QUESTION 4



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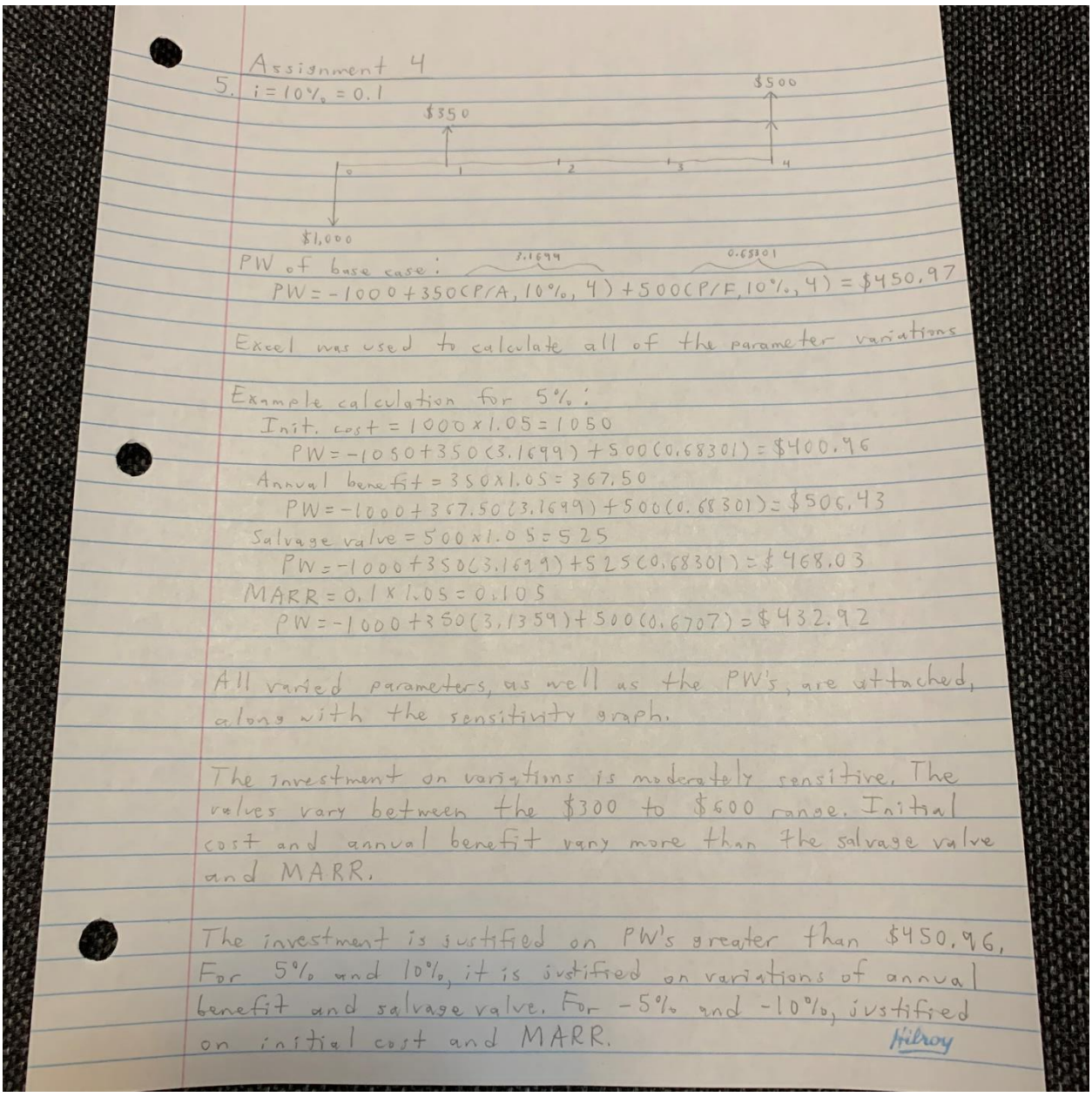
5 QUESTION 5



Assignment 4

5. $i = 10\% = 0.1$

PW of base case: 3.1699 0.68301

$PW = -1000 + 350(P/A, 10\%, 4) + 500(P/F, 10\%, 4) = \$450.97$

Excel was used to calculate all of the parameter variations

Example calculation for 5%:

Init. cost $= 1000 \times 1.05 = 1050$

$PW = -1050 + 350(3.1699) + 500(0.68301) = \$400.96$

Annual benefit $= 350 \times 1.05 = 367.50$

$PW = -1000 + 367.50(3.1699) + 500(0.68301) = \$506.43$

Salvage value $= 500 \times 1.05 = 525$

$PW = -1000 + 350(3.1699) + 525(0.68301) = \$468.03$

$MARR = 0.1 \times 1.05 = 0.105$

$PW = -1000 + 350(3.1359) + 500(0.6707) = \$432.92$

All varied parameters, as well as the PW's, are attached, along with the sensitivity graph.

The investment on variations is moderately sensitive. The values vary between the \$300 to \$600 range. Initial cost and annual benefit vary more than the salvage value and MARR.

The investment is justified on PW's greater than \$450.96, For 5% and 10%, it is justified on variations of annual benefit and salvage value. For -5% and -10%, justified on initial cost and MARR.

Hilroy

Summary of Data

	-10%	-5%	0	5%	10%
Initial Cost	900	950	1000	1050	1100
Annual Benefit	315	332.5	350	367.5	385
Salvage Value	450	475	500	525	550
MARR	0.09	0.095	0.1	0.105	0.11
n	4				

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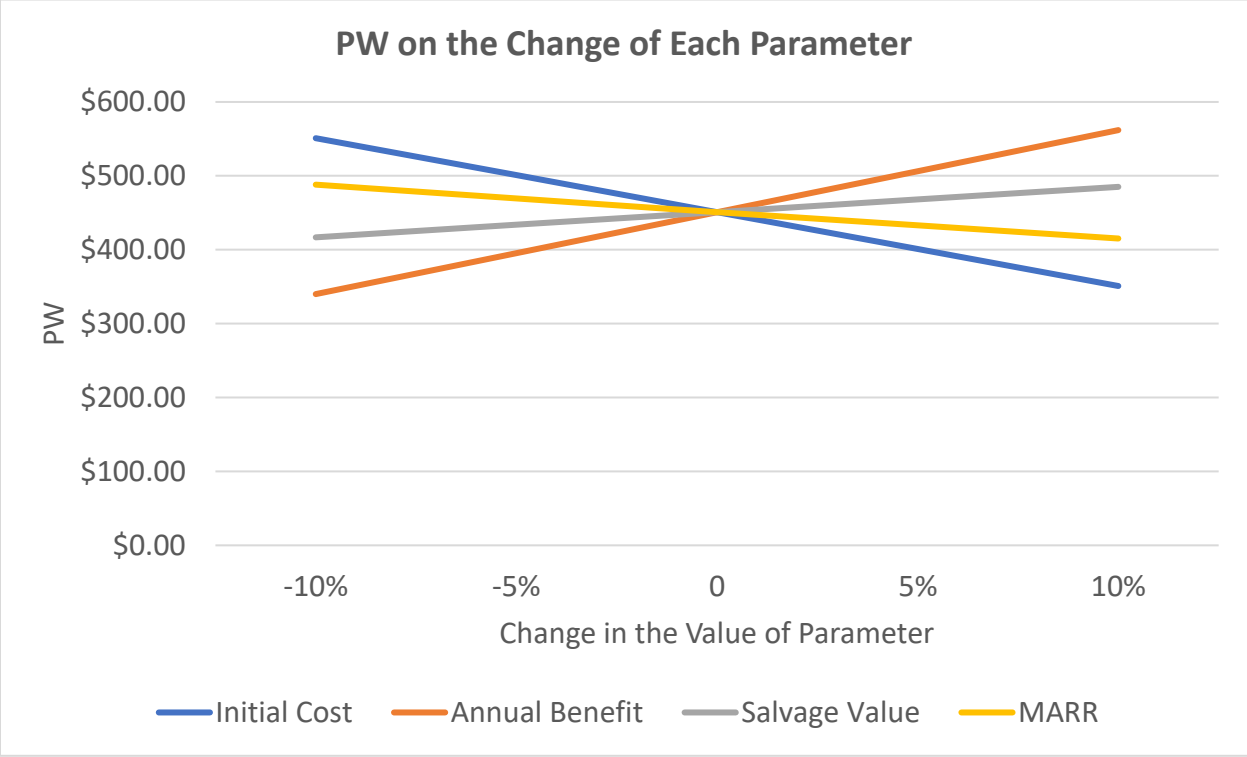
(P/A, 10%, 4)	3.23971988	3.20448112	3.169865	3.13585834	3.10244569
(P/F, 10%, 4)	0.70842521	0.69557429	0.683013	0.67073487	0.65873097

PW of Each Case

	-10%	**-5%**	**0**	**5%**	**10%**
Initial Cost	$550.96	$500.96	$450.96	$400.96	$350.96
Annual Benefit	$340.01	$395.49	$450.96	$506.43	$561.90
Salvage Value	$416.81	$433.88	$450.96	$468.03	$485.11
MARR	$488.11	$469.36	$450.96	$432.92	$415.22



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