

AAE 320 Problem Set #4

Due October 30, 2019

Name: KEY

1) You had a milking barn built and bought a used tractor planter. The milking barn cost \$400,000 and the tractor cost \$130,000. For your internal farm accounting purposes, you will depreciate the milking barn over 12 years and the tractor over 10 years. The milking barn will have zero salvage value, but the tractor will have a salvage value of \$20,000. For this problem, fill out the following 4 tables that report the value of the asset at the beginning of each year, the amount of depreciation during each year and the value at the end of each year. There are 2 tables for the milking barn and 2 for the tractor. For each asset, one table uses Straight Line depreciation, the other uses 200% Declining Balance. Do the full life cycle for each asset (12 years for the barn and 10 years for the tractor). For the 200% Declining Balance, do not let the asset value fall below the salvage value (set depreciation to zero if needed) and if the implied value does not reach the salvage value by the end of the useful life, take the remaining value as depreciation in the last year.

Milking Barn, Straight Line				Milking Barn, 200% Declining Balance		
Year	Beginning Basis	Depreciation	Ending Basis	Beginning Basis	Depreciation	Ending Basis
1	400,000	33,333	366,667	400,000	66,667	333,333
2	366,667	33,333	333,333	333,333	55,556	277,778
3	333,333	33,333	300,000	277,778	46,296	231,481
4	300,000	33,333	266,667	231,481	38,580	192,901
5	266,667	33,333	233,333	192,901	32,150	160,751
6	233,333	33,333	200,000	160,751	26,792	133,959
7	200,000	33,333	166,667	133,959	22,327	111,633
8	166,667	33,333	133,333	111,633	18,605	93,027
9	133,333	33,333	100,000	93,027	15,505	77,523
10	100,000	33,333	66,667	77,523	12,920	64,602
11	66,667	33,333	33,333	64,602	10,767	53,835
12	33,333	33,333	0	53,835	8,973	44,863
Correction in year 12 for missing salvage value			12	53,835	53,835	0

Tractor, Straight Line				Tractor, 200% Declining Balance		
Year	Beginning Basis	Depreciation	Ending Basis	Beginning Basis	Depreciation	Ending Basis
1	130,000	11,000	119,000	130,000	26,000	104,000
2	119,000	11,000	108,000	104,000	20,800	83,200
3	108,000	11,000	97,000	83,200	16,640	66,560
4	97,000	11,000	86,000	66,560	13,312	53,248
5	86,000	11,000	75,000	53,248	10,650	42,598
6	75,000	11,000	64,000	42,598	8,520	34,079
7	64,000	11,000	53,000	34,079	6,816	27,263
8	53,000	11,000	42,000	27,263	5,453	21,810
9	42,000	11,000	31,000	21,810	4,362	17,448
10	31,000	11,000	20,000	17,448	3,490	13,959
Correction in years 9-10 for missing salvage value			9	21,810	1,810	20,000
			10	20,000	0	20,000

See last page for 150% declining balance for Tractor

2) In this problem, you will figure the depreciation you can claim for tax purposes for the milking barn. Use IRS Publication 946: How to Depreciate Property <https://www.irs.gov/pub/irs-pdf/p946.pdf>. This is the latest version, for preparing 2018 taxes. For this problem, you will use MACRS, electing the GDS option and not claiming any Section 179 depreciation. Read “Which Depreciation System (GDS or ADS) Applies?” beginning on p. 27. I do not fully understand the types of farm property that are required to use ADS, but from reading “Depreciation Methods for Farm Property” (p. 33) and the next section (“Electing a Different Method”), ADS would seem to use straight line depreciation.

a) Read “Which Property Class Applies under GDS” starting on p. 28. What property class (3-year, 5-year, 7-year, etc.) must be used for the barn (a farm building) that, for tax purposes, is technically not a single purpose agricultural or horticultural structure? Read “Recovery Periods Under GDS” on p. 31, but especially see Appendix B, beginning on page 95, especially page 97 where common agricultural assets are listed. What recovery period (how many years) must be used for the milking barn?

Recovery Period = 20 Years

b) Suppose you built the milking barn and had it ready for use in March of 2018. Read “Which Convention Applies?” on p. 32. The milking barn is not “nonresidential real property”. Because the milking barn was “placed in service” before the final three months of the year and is not a large portion of the total depreciable property you will claim for deductions during the 4th quarter, I interpret this section to mean that you should use the mid-quarter convention, with the asset placed in service during the 1st quarter. Using Chart 1 on p. 67, which depreciation table must be used for the milking barn?

Depreciation Table = A2

GDS	150%	GDS/15, 20	Mid-Quarter	15 & 20	1st Qtr 2nd Qtr 3rd Qtr 4th Qtr	A-2 A-3 A-4 A-5
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c) Use the appropriate depreciation table to calculate the depreciation you will be able to claim as a deduction each year for the milking barn’s useful life as defined for tax purposes. What I want is a table starting in 2018 (when the milking barn was “placed in service”) and what percentage of the original cost you can claim as a depreciation cost each year until the milking barn it totally depreciated for tax purposes. I have created an empty table on the next page for 26 years, which is likely more than needed. You will simply copy in the depreciation percentages from the table you determined in part b and then calculate the depreciation dollars you will claim for the next 26 years (some of the last years may be 0), and then the remaining basis (asset value for tax purposes) at the end of the year. The Depreciation (\$) is the depreciation expenses for the milking barn that you could deduct from your taxable income during each year and the Remaining Basis is what you would use for depreciation recapture if you sold or transferred the building.

Note: I found it easier to use a spreadsheet program to do the calculations, and then copy the values into the table.

Tax Depreciation for the Milking Barn (\$400,000 initial value).

Calendar Year	Asset Year	Depreciation (%) (from tax table)	Depreciation (\$)	Remaining Basis
2017	1	6.563%	6.563% x \$400,000 = \$26,252	\$373,748
2018	2	7.000%	7.000% x \$400,000 = \$28,000	\$345,748
2019	3	6.482%	6.482% x \$400,000 = \$25,928	\$319,820
2020	4	5.996%	5.996% x \$400,000 = \$23,984	\$295,836
2021	5	5.546%	5.546% x \$400,000 = \$22,184	\$273,652
2022	6	5.130%	5.130% x \$400,000 = \$20,520	\$253,132
2023	7	4.746%	4.746% x \$400,000 = \$18,984	\$234,148
2024	8	4.459%	4.459% x \$400,000 = \$17,836	\$216,312
2025	9	4.459%	4.459% x \$400,000 = \$17,836	\$198,476
2026	10	4.459%	4.459% x \$400,000 = \$17,836	\$180,640
2027	11	4.459%	4.459% x \$400,000 = \$17,836	\$162,804
2028	12	4.460%	4.460% x \$400,000 = \$17,840	\$144,964
2029	13	4.459%	4.459% x \$400,000 = \$17,836	\$127,128
2030	14	4.460%	4.460% x \$400,000 = \$17,840	\$109,288
2031	15	4.459%	4.459% x \$400,000 = \$17,836	\$91,452
2032	16	4.460%	4.460% x \$400,000 = \$17,840	\$73,612
2033	17	4.459%	4.459% x \$400,000 = \$17,836	\$55,776
2034	18	4.460%	4.460% x \$400,000 = \$17,840	\$37,936
2035	19	4.459%	4.459% x \$400,000 = \$17,836	\$20,100
2036	20	4.460%	4.460% x \$400,000 = \$17,840	\$2,260
2037	21	0.565%	0.565% x \$400,000 = \$2,260	\$0
2038	22	xxxx	xxxx	xxxx
2039	23	xxxx	xxxx	xxxx
2040	24	xxxx	xxxx	xxxx
2041	25	xxxx	xxxx	xxxx
2042	26	xxxx	xxxx	xxxx

d) For this problem, you want to see if you can take Section 179 depreciation for the tractor. Skim over IRS Pub 946 Electing the Section 179 Deduction beginning on p. 14. Focus on determining whether the tractor (a type of machinery or equipment) qualifies for this deduction (see Eligible Property p. 15 and following) and how much you can claim (see How Much Can you Deduct (p. 17 and following), and especially “Married Individuals” (p. 18).

Specific questions to answer for this problem:

- i. Does the tractor qualify for Section 179 depreciation deduction?

Yes. It is “tangible personal property”, specifically “machinery and equipment” (p. 15-16).

- ii. Suppose the farm and the spouse’s business bought and placed in service a lot of eligible property (\$2,800,000) in 2018 and they file a joint tax return. Could the couple claim Section 179 depreciation for all \$2,800,000? If not, how much Section 179 depreciation could they claim in total between the two of them?

No, the maximum allowable Section 179 deduction is \$1,000,000. In total, they could only claim \$700,000 because their property placed in service exceeds the cost limit of \$2,500,000. This maximum Section 179 allowance of \$1,000,000 is reduced for every dollar of eligible property over \$2,500,000. The \$2,800,000 is \$300,000 over the cost limit, so they can only take \$1,000,000 – \$300,000 = \$700,000 of Section 179 depreciation as a couple. See the Example of Jack Elm and his spouse (p. 18).

3) Use the Sample Farm Balance Sheet on the next page to answer the following questions:

- a) What is this farm’s current ratio? (Show your calculation.)

$$\text{Current Ratio} = \text{Current Assets} / \text{Current Liabilities} = \$904,702 / \$397,963 = 2.27$$

Interpret this farm’s current ratio—Is the farm doing okay or is there a problem?

The current ratio measures liquidity of the farm, i.e., how easily it can respond to short term cash needs, or how much of a margin it has to cover short term cash needs. See the class notes for examples of typical current ratios. Notice that the balance sheet does not explain what type of farm this is, so it’s hard to exactly compare it to the appropriate type of farms. In general, this ratio seems fine. However, if this is a Wisconsin dairy farm (or other farm with regular cash revenues), it is likely a little too high. However, if it is a cash grain farm, it may be a little too low for this time of year (Dec 31), since the farm should have a lot of grain on hand or just have sold it for cash.

- b) Using a market basis to value assets, what was this farm’s debt to asset ratio? (Show your calculation.)

$$\text{Debt to Asset Ratio} = \text{Total Liabilities} / \text{Total Assets} = \$835,736 / \$2,822,663 = 0.296$$

Using a cost basis to value assets, what was this farm’s debt to asset ratio? (Show your calculation.)

$$\text{Debt to Asset Ratio} = \text{Total Liabilities} / \text{Total Assets} = \$835,736 / \$2,520,413 = 0.332$$

Interpret this farm’s ratios—Is the farm doing okay or is there a problem?

The Debt to Asset Ratio measures solvency, how close the farm is to being able to cover all its outstanding liabilities. Another way to think of it is the proportion of the farm assets that are owned by whomever providing equity to you (e.g., the bank). These ratios imply that the bank or whomever owns less than a third of the farm assets whether you use a market or cost basis. You can use the class notes to compare these to typical ratios in different states and across different farm types, but in general this ratio is solid.

- c) Suppose the farm bought 40 acres of land for \$8,000/acre with a bank loan that had zero down payment and 0% interest for the first year. Using a market basis for assets, how would this change i) the farm's current ratio, ii) the farm's debt to asset ratio, and c) the farm's equity?

The total purchase price is 40 acres x \$8,000/acre = \$320,000, all financed by a bank. Normally, a land purchase would require a down payment (i.e., a reduction in current assets) and some payments due within the first year (i.e., current liabilities), but the zero down payment and 0% interest for the first year means the only changes are an increase of \$320,000 for non-current assets (due to zero down payment) and only an increase in non-current liabilities (due to 0% interest for the first year). Thus,

- i) The farm's current ratio: *Does not change, since Current Ratio = Current Assets/Current Liabilities and neither has changed.*
- ii) The farm's debt to asset ratio: *Changes because Debt to Asset Ratio = Total Liabilities/Total Assets and both non-current liabilities and non-current assets increase. Using a market basis, the new ratio would be*

$$= (\$835,736 + \$320,000) / (\$2,822,663 + \$320,000) = 0.368$$

$$= \$1,155,736 / \$3,142,663 = 0.368 \text{ versus } 0.296$$
The farm has become more leveraged
- iii) The farm's equity: *Equity (or net worthy) has not changed, since only outside equity has been brought into the farm via the bank loan.*

Sample Farm Balance Sheet

Name Cyclone Farm

Date December 31, 2017

Farm Assets	Cost Value	Market Value	Farm Liabilities	Market Value
Current Assets (cost and market values are the same)			Current Liabilities	
Checking, savings accts.	\$16,665	\$16,665	Accounts payable	\$1,859
Hedging accounts	47,909	47,909	Farm taxes due	4,750
Crops held for sale/feed	489,105	489,105	Current notes and credit lines	340,200
Investment in annual crops	8,680	8,680	Accrued interest - current	3,049
Commercial feed on hand	10,940	10,940	- fixed	19,435
Prepaid expenses			Principal due on notes and contracts	
Market livestock	329,403	329,403	Due in 12 months - fixed	28,670
Supplies on hand	2,000	2,000		
Accounts receivable			Other current liabilities	
Other current assets			Other current liabilities	
a. Total Current Assets	\$904,702	\$904,702	d. Total Current Liabilities	\$397,963
Fixed Assets (cost and market values may differ)			Fixed Liabilities	
Unpaid co-op. distributions	\$28,861	\$28,861	Notes and contracts, principal due beyond 12 months	
Invest. in perennial crops	157,500	157,500	- Machinery	\$168,673
Breeding livestock	222,600	222,600	- Land	269,100
Machinery & equipment	255,240	275,000	- Other fixed assets	
Buildings/improvements	138,510	171,000		
Farmland	800,000	1,050,000	Other fixed liabilities	
Farm securities, certificates	13,000	13,000	Other fixed liabilities	
Other fixed assets				
b. Total Fixed Assets	\$1,615,711	\$1,917,961	e. Total Fixed Liabilities	\$437,773
c. Total Farm Assets (a + b)	\$2,520,413	\$2,822,663	f. Total Farm Liabilities (d + e)	\$835,736
g. Farm Net Worth (c - f)	\$1,684,677	\$1,986,927		

Tractor, 150% Declining Balance

Year	Beginning Basis	Depreciation	Ending Basis
1	130,000	19,500	110,500
2	110,500	16,575	93,925
3	93,925	14,089	79,836
4	79,836	11,975	67,861
5	67,861	10,179	57,682
6	57,682	8,652	49,029
7	49,029	7,354	41,675
8	41,675	6,251	35,424
9	35,424	5,314	30,110
10	30,110	4,547	25,564
10	30,110	110	30,000

Correction in year 10 for missing the salvage value