AAE 320 Problem Set #4 **Due October 28, 2022** **Name:** KEY

1) You had a small barn built and bought a used combine harvester. The barn cost $500,000 and the combine cost $250,000. For your internal farm accounting purposes, you will depreciate the barn over 11 years and the combine over 9 years. The barn will have zero salvage value, but the combine will have a salvage value of $100,000. 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 barn and 2 for the combine. For each asset, one table uses Straight Line depreciation, the other uses 150% Declining Balance. Do the full life cycle for each asset (11 years for the barn and 9 years for the combine). For the 150% 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.

Barn, Straight Line

Year	Beginning Basis	Depreciation	Ending Basis
1	500,000	45,455	454,545
2	454,545	45,455	409,091
3	409,091	45,455	363,636
4	363,636	45,455	318,182
5	318,182	45,455	272,727
6	272,727	45,455	227,273
7	227,273	45,455	181,818
8	181,818	45,455	136,364
9	136,364	45,455	90,909
10	90,909	45,455	45,455
11	45,455	45,455	0

Barn, 150% Declining Balance

Beginning Basis	Depreciation	Ending Basis
500,000	68,182	431,818
431,818	58,884	372,934
372,934	50,855	322,079
322,079	43,920	278,159
278,159	37,931	240,229
240,229	32,758	207,470
207,470	28,291	179,179
179,179	24,433	154,745
154,745	21,102	133,644
133,644	18,224	115,420
115,420	~~15,739~~ 115,420	~~99,680~~ 0

Correction in year 11 to meet salvage value

Combine, Straight Line

Year	Beginning Basis	Depreciation	Ending Basis
1	250,000	16,667	233,333
2	233,333	16,667	216,667
3	216,667	16,667	200,000
4	200,000	16,667	183,333
5	183,333	16,667	166,667
6	166,667	16,667	150,000
7	150,000	16,667	133,333
8	133,333	16,667	116,667
	116,667	16,667	100,000

Combine, 150% Declining Balance

Beginning Basis	Depreciation	Ending Basis
250,000	41,667	208,333
208,333	34,722	173,611
173,611	28,935	144,676
144,676	24,113	120,563
120,563	20,094	100,469
100,469	~~16,745~~ 469	~~83,724~~ 100,000
~~83,724~~ 100,000	~~13,954~~ 0	~~69,770~~ 100,000
~~69,770~~ 100,000	~~11,628~~ 0	~~58,142~~ 100,000
~~58,142~~ 100,000	~~9,690~~ 0	~~48,452~~ 100,000

Correction in year 5 to meet salvage value

2) In this problem, you will figure the depreciation you can claim for tax purposes for the barn. Use IRS Publication 946: How to Depreciation Property https://www.irs.gov/pub/irs-pdf/p946.pdf. This is the latest version, for preparing 2021 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 rules and options, but it seems that farm property generally uses 200% declining balance, but farmers can elect 150% declining balance and even straight line from my reading of "Depreciation Methods for Farm Property" (p. 34), the next section ("Electing a Different Method"), and Table 4.1, but I am no tax expert. If I were a farmer, I would hire a farm tax expert to do my farm taxes.

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 98, especially page 99 where common agricultural assets are listed. What recovery period (how many years) must be used for the barn?

Recovery Period = ___20 Years___

b) Suppose you built the barn and had it ready for use in June of 2021. Read "Which Convention Applies?" on p. 33-34. The barn is not "nonresidential real property". Because the 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 2nd quarter. Using Chart 1 on p. 69, which depreciation table must be used for the barn?

Depreciation Table = ___A-3____

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

c) Use the appropriate depreciation table to calculate the depreciation you will be able to claim as a deduction each year for the barn's useful life as defined for tax purposes. What I want is a table starting in 2021 (when the barn was "placed in service") and what percentage of the original cost you can claim as a depreciation cost each year until the 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 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 Barn ($500,000 initial value).

Calendar Year	Asset Year	Depreciation (%) (from tax table)	Depreciation ($)	Remaining Basis
2021	1	4.688%	4.688% x $500,000 = $23,440	476,560
2022	2	7.148%	7.148% x $500,000 = $35,740	440,820
2023	3	6.612%	6.612% x $500,000 = $33,060	407,760
2024	4	6.116%	6.116% x $500,000 = $30,580	377,180
2025	5	5.658%	5.658% x $500,000 = $28,290	348,890
2026	6	5.233%	5.233% x $500,000 = $26,165	322,725
2027	7	4.841%	4.841% x $500,000 = $24,205	298,520
2028	8	4.478%	4.478% x $500,000 = $22,390	276,130
2029	9	4.463%	4.463% x $500,000 = $22,315	253,815
2030	10	4.463%	4.463% x $500,000 = $22,315	231,500
2031	11	4.463%	4.463% x $500,000 = $22,315	209,185
2032	12	4.463%	4.463% x $500,000 = $22,315	186,870
2033	13	4.463%	4.463% x $500,000 = $22,315	164,555
2034	14	4.463%	4.463% x $500,000 = $22,315	142,240
2035	15	4.462%	4.462% x $500,000 = $22,310	119,930
2036	16	4.463%	4.463% x $500,000 = $22,315	97,615
2037	17	4.462%	4.462% x $500,000 = $22,310	75,305
2038	18	4.463%	4.463% x $500,000 = $22,315	52,990
2039	19	4.462%	4.462% x $500,000 = $22,310	30,680
2040	20	4.463%	4.463% x $500,000 = $22,315	8,365
2041	21	1.673%	1.673% x $500,000 = $8,365	0
2042	22	xxxx	xxxx	xxxx
2043	23	xxxx	xxxx	xxxx
2044	24	xxxx	xxxx	xxxx
2045	25	xxxx	xxxx	xxxx
2046	26	xxxx	xxxx	xxxx

d) For this problem, you want to see if you can take Section 179 depreciation for the combine. Skim over IRS Pub 946 Electing the Section 179 Deduction beginning on p. 15. Focus on determining whether the combine (a type of machinery or equipment) qualifies for this deduction (see Eligible Property p. 16 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 combine qualify for Section 179 depreciation deduction?

Yes. It is "tangible personal property", specifically "machinery and equipment" (p. 16).

ii. Suppose the farm and the spouse's business bought and placed in service lots of eligible equipment ($2,700,000) in 2021 and they file a joint tax return. Could the couple claim Section 179 depreciation for all $2,700,000? 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 $1,050,000. In total, they could only claim $970,000 because their property placed in service exceeds the cost limit of $2,620,000. This maximum Section 179 allowance of $1,050,000 is reduced for every dollar of eligible property over $2,620,000. The $2,700,000 is $80,000 over the cost limit, so they can only take $1,050,000 – $80,000 = $970,000 of Section 179 depreciation as a couple. See the Example of Jack Elm and his spouse (p. 19).

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.)

Current Ratio = Current Assets/ 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 excess 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, what was the farm's debt to asset ratio? (Show your calculation.)

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

Using a cost basis, what was the farm's debt to asset ratio? (Show your calculation.)

Debt to Asset Ratio = Total Liabilities/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 is 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 were to buy 80 acres of land for $18,000/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

The total purchase price is 80 acres x $18,000/acre = $1,440,000, 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 $1,440,000 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 + $1,440,000) / ($2,822,663 + $1,440,000)
= $2,275,736 / $4,262,663 = 0.534 versus 0.296 before
The farm has become more substantially 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**		