AAE 320 Fall 2018   **Final Exam**   Name: _____ **KEY** _____

1) (20 pts. total, 2 pts. each) True or False? Mark your answer.

a) T___ F **X**   Wisconsin's is the third largest dairy state in the U.S., with total annual milk production third after California and Washington state.

b) T___ F **X**   Most Wisconsin corn and soybean growers insure their crops using Area Yield Protection (AYP) with a 70%-80% coverage level.

c) T **X** F___   In the US, though most business may use accrual accounting, most farms use cash accounting.

d) T **X** F___   USDA data presented in class show that small farms are more likely to have low household income than large-scale farms.

e) T **X** F___   Crop insurance premiums are subsidized so that farmers pay less than the actuarially fair premium.

f) T **X** F___   One reason farmers use too much of some inputs (put some more on) is that underuse is obvious, overuse is invisible and the inputs are low cost.

g) T___ F **X**   The Dairy Margin Protection Program created by the 2014 Farm Bill has been very popular with farmers, with no changes expected for 2019.

h) T___ F **X**   After 3 years of low income, many farmers have been receiving large government payments and are struggling to invest their excess capital.

i) T___ F **X**   Common advice from the Let's Talk About "Beginning Farmers" was not to worry about costs and personal finances until after the first season.

j) T **X** F___   Agricultural supply and food demand are relatively inelastic, so large price changes mean small quantity changes by farmers and food consumers.

2a) (6 pts.) What is required for a farmer to be eligible to enroll for the potential to receive corn Price Loss Coverage (PLC) or County Agriculture Risk Coverage (County ARC) payments?

Operate a farm with corn base acres

Suppose a farmer is eligible—what triggers a corn PLC Payment?

National Marketing Year Average Price less than the Reference Price ($3.70).

Suppose a farmer is eligible—what triggers a corn County ARC Payment?

Actual County Revenue less than the county revenue guarantee for that county

2b) (6 pts.) You operate a farm that has 40 corn base acres enrolled in County ARC. The county guarantee is $575/ac for 2018. The USDA announces that the 2018 county average yield is 150 bu/ac and the USDA national marketing year average price is $3.50. Your actual corn yield for the farm was 120 bu/ac and you sold the corn for $4.00/bu. What is your 2018 County ARC payment for the farm? (Remember you only receive 85% of the full payment).

Actual County Revenue =150 bu/ac x $3.50.bu =$525/ac < $575 guarantee, payment triggered
ARC Payment = 85% x 40 ac x (575 – 525) = $1,700

What is your 2018 County ARC payment if instead you sell your 2018 corn crop for $3.20?

The same, still $1,700

What is your 2018 County ARC payment if you receive an insurance indemnity of $35 per acre?

The same, still $1,700

What is your 2018 County ARC payment for corn if you only plant soybeans on the farm?

The same, still $1,700

2c) (4 pts.) You operate a farm that has 30 soybean base acres enrolled in PLC with a 40 bu/ac payment yield. The 2018 USDA national marketing year average price is $8.10, though you sell your crop for $8.20/bu and harvested 35 bu/ac. The PLC Reference price is $8.40/bu. What is your 2018 PLC payment for the farm? (Remember you only receive 85% of the full payment).

National marketing year average price of $8.10 < Reference Price of $8.40, payment triggered
PLC payment = 85% x 30 ac x 40 bu/ac x ($8.40 – $8.10) = $306

What is your 2018 PLC payment if you feed your 2018 soybean crop to your livestock?

The same, still $306

3) (16 pts. total) Your farm has 200 corn base acres with a payment yield of 150 bu/ac, or 200 x 150 = 30,000 bu of corn. You planted 100 corn acres with 75% Yield Protection (YP) insurance and a guarantee of 75% x 170 bu/ac x 100 ac = 12,750 bushels. Your harvested yield averaged 200 bu/ac x 100 aces = 20,000 bushels. You bought 15,000 bushels of corn from a neighbor.
3a) (5 pts.) Suppose you want to get a Marketing Assistance Loan (MAL). Place an X by **ALL** of the following options that you can use as collateral for a MAL.

A_____ The 15,000 bushels of corn you bought from your neighbor
B_____ The 12,750 bushels of corn from your YP yield guarantee
C_____ The 30,000 bushels of corn from your base acres
D **X** The 20,000 bushels of corn you harvested from your farm
E_____ None of these, you need to have Revenue Protection (RP) to get a MAL

3b) (2 pts.) You use 10,000 bushels of eligible corn as collateral for a Marketing Assistance Loan (MAL). Using the corn loan rate is $1.95/bu, how large would your loan be?

MAL = 10,000 bu x $1.95/bu =$19,500

3c) (6 pts.) For this MAL, place an X by **ALL** of the following cases in which you would also receive a Loan Deficiency Payment.

      A____Pay back the MAL when the National Marketing Year Average Price is less than
          the target price for counter-cyclical payments
      B____Pay back the MAL using corn from your corn base acres
      C____Pay back the MAL with a PLC (Price Loss Coverage) or county ARC (Agriculture
          Risk Coverage) payment
      D____Pay back the MAL with a Yield Protection (YP) or Revenue Protection (RP) crop
          insurance indemnity
      E____Pay back the MAL when the Chicago Mercantile Exchange's November average
          of the December corn futures price is less than the loan rate
      F **X** You would <u>not</u> receive a Loan Deficiency Payment under any of these conditions

3d) (3 pts.) What is the main benefit to farmers for using Marketing Assistance Loans, even if they do not expect to receive Loan Deficiency Payments?

The program provides low interest loans to help farmers manage cash flow issues, such as to pay back an operating loan due right after harvest, so they can hold the grain and sell later when prices tend to be higher.

4) (10 pts. total) You insure 300 acres of corn in one unit with an average yield of 180 bu/ac.
4a) (4 pts.) You buy 80% Yield Protection (YP) crop insurance. What is your per acre yield guarantee? What is the total yield guarantee for your 300 ac unit?

Per Acre Guarantee = 80% x 180 bu/ac = 144 bu/ac
Unit Guarantee = 144 bu/ac x 300 ac = 43,200 bu

4b) (4 pts.) You harvest a yield of 130 bu/ac from the unit. How many bushels do you harvest from the unit? What would be your insurance indemnity with a price election of $4.00/bu?

Harvest = 130 bu/ac x 300 ac = 39,000 bu from the unit
39,000 bu < 43,200 bu guarantee, indemnity triggered
Indemnity = $4.00 x (43,200 – 39,000) = $16,800

4c) (2 pts.) Again, you harvest a yield of 130 bu/ac from the 300 acre unit. What would be your indemnity with a price election of $4.00/bu if you sell the corn for $3.00/bu in April?

The same, $16,800

5) (14 pts. total) Suppose a farm has 100 acres of soybeans in one insured unit with an average yield of 45 bu/ac as established by crop insurance rules and the Base Price is $10.00/bu.

5a) (4 pts.) Suppose the farm buys 80% Revenue Protection (RP) crop insurance. What is the initial per acre revenue guarantee? What is the initial revenue guarantee for the 100 acre unit?

Initial per acre revenue guarantee = 80% x $10/bu x 45 bu/ac = $360/ac

Initial revenue guarantee for the unit = $360/ac x 100 ac = $36,000

For 5b and 5c, the price decreases over the season so that the official Harvest Price is $8.00/bu.

5b) (2 pts.) What is the final revenue guarantee for the 100 acre unit?

Maximum of base price and harvest price is still $10/bu, so the Final Guarantee is still $36,000.

5c) (2 pts.) Suppose the farmer actually harvests 4,000 bushels of soybeans from the unit, what would be the insurance indemnity, if any?

Actual Revenue = 4,000 bu x $8.00/bu = $32,000, which is less than the Final Guarantee of $36,000, so an indemnity is triggered.

Indemnity = $36,000 – $32,000 = $4,000

For 5d to 5f, the price increases over the season so that the official Harvest Price is $11.00/bu.

5d) (2 pts.) What is the final revenue guarantee for the 100 acre unit?

Maximum of base price and harvest price is now $11/bu, so the Final Guarantee is updated to:
80% x $11/bu x 45 bu/ac = $396/ac and x 100 ac = $39,600

5e) (2 pts.) Suppose the farmer actually harvests 4,000 bushels of soybeans from the unit, what would be the insurance indemnity, if any?

Actual Revenue = 4,000 bu x $11.00/bu = $44,000, which is greater than the Final Guarantee of $39,600, so no indemnity is triggered.

Indemnity = $0

5f) (2 pts.) Suppose the farmer actually were to sell the harvested soybeans for $9.00/bu in May. How much would the crop insurance indemnity change?

The indemnity does not depend on the price the farmer actually receives, so there is no change.

6 (12 pts.) Mark an X in each box to indicate which yield and price each program or policy uses to determine payments. Note, each column will have at least one X for Yield and Price.

	PLC: Price Loss Coverage	AYP: Area Yield Protection	YP: Yield Protection
Yield			
Actual Farm Yield			X
County Average Yield		X	
Payment Yield for Base Acres	X		
Price			
Actual Farm Price			
Chicago Mercantile Exchange Price		X	X
National Marketing Year Average Price	X		

7a) (2 pts.) What triggers an indemnity for the Area Revenue Protection (ARP) crop insurance?

Actual county revenue below the county revenue guarantee the farmer chooses. Actual county revenue is county average yield announced by USDA NASS multiplied by the harvest price based on the Chicago Mercantile Exchange prices for futures contracts.

7b) (4 pts.) You insure 300 acres of corn with an Area Revenue Protection (ARP) crop insurance policy with a 90% coverage level. The base price is $4.00/bu, so the initial county revenue guarantee is 90% x 160 bu/ac x $4.00/bu = $576/ac. Actual county yield is 130 bu/ac, but actual farm yield is 140 bu/ac, the official harvest price is $3.80/bu, but you sell the corn for $3.50/bu. What would be the total insurance indemnity for all 300 acres?

Final revenue guarantee = 90% x 160 bu/ac x max($4.00, $3.80) = $576/ac [No Change]
Actual county revenue = 130 bu/ac x $3.80 = $494/ac
Indemnity per acre = $576 – $494 = $82/ac
*Total Indemnity = $82/ac x 300 ac = **$24,600***

7c) (4 pts.) Mark an X the box indicating how each event <u>directly</u> affects the ARP indemnity.

Event	Increase It	Decrease It	No Change
You don't sell your corn, but feed it to livestock			X
Flooding causes county yield to fall to 100 bu/ac	X		
Due to hail, your farm yield falls to 100 bu/ac			X
Tariffs cause the harvest price to fall to $3.40	X		

8) (4 pts. total) Answer the following questions about business entities and liability.

8a) (2 pts.) Which business entities discussed in class (sole proprietor, partnership, C and S-corporations, limited liability company) <u>must</u> register with the state's Department of Financial Institutions to be a legal business entity?

C and S Corporations, LLC, plus limited partnerships for limited partners

8b) (2 pts.) Consider the business entities discussed in class (sole proprietor, partnership, C and S-corporations, limited liability company). The owners of which of these entities do <u>not</u> have their personal assets directly liable to pay the financial liabilities of the business?

C and S Corporations, LLC, plus limited partnerships for limited partners

9) (8 pts. total) Provide short answers to these questions. Jonathan and Taylor own a farm, with all assets owned as marital property with a right of survivorship under Wisconsin's marital property law. Among their assets is land worth $300,000 with a tax basis of $100,000 and corn worth $50,000 with a $0 tax basis (they raised it). Answer each question below.

9a) (2 pts.) If Jonathan and Taylor <u>gave</u> the land and corn to their son. How much gain must Jonathan and Taylor report for tax purposes?

      Land Gain = ___***None***,___ *gift does not trigger recognition of gain*___

      Corn Gain = ___***None***,___ *gift does not trigger recognition of gain*___

9b) (2 pts.) What is their son's tax basis in the land and in the corn?

      Land Basis = __***$100,000***,___ *basis transfers with gift*_____

      Corn Basis = __***$50,000***,___ *basis transfers with gift*___

9c) (2 pts.) If their son then sold the land for $300,000 and corn for $50,000, how much gain must he report for tax purposes?

      Land Gain = _*$300,000 – $1000,000 = **$200,000**___

      Corn Gain = _*$50,000 – $0 = **$50,000**___

9d) (2 pts.) Considering ordinary income tax, self-employment tax, and capital gain tax, which one or ones of these taxes would their son owe on this gain from the land sale? Which one or ones of these taxes would their son owe on this gain from the corn sale?

      Taxes types owed on Land sale = ___*Capital Gains*_____

      Taxes types owed on Corn sale = ___*Ordinary Income and Self-Employment*___

10) (9 pts.) On your farm you grow soybeans, with an average yield of 60 bu/acre and an expected soybean price of $9/bu. You are considering whether to use a seed treatment for early season insects and diseases. Talking to the sales person, you estimate that it will increase your yield by 2%, but it costs $15 per acre. Also, because you get better stand establishment, you can plant fewer seeds per acre, reducing your seed costs per $10 per acre.

a) (7 pts.) Use the given information to conduct a partial budget analysis of this switch to using a seed treatment by filling in the table below. Show your calculations in the space provided.

Benefits		Costs	
Additional Revenues What new revenue will be generated? *Value of Yield Gain* *2% x 60 bu/ac x $9.00/bu = $10.80/ac*		Additional Costs What new costs will be added? *$15/ac fore seed treatment*	
Costs Reduced What costs will be eliminated? *$10/ac in lower seed costs*		Revenues Reduced What revenues will be lost? *None*	
Total Benefits ($/ac)	*$20.80/ac*	Total Costs ($/ac)	*$15.00/ac*
Total Benefits – Total Costs = Net Benefit ($/ac)			*$5.80/ac*

b) (2 pts.) Based on your results, considering only the money earned, is buying the soybean seed treatment a profitable change? Briefly explain.

Yes, the farmer will gain $5.80/ac based on these assumptions.

11) (6 pts. total) You are deciding on nitrogen for your corn crop. This table gives the nitrogen applied (pounds/ac) and the corn yield (bu/ac).

Nitrogen (pounds/ac)	Yield (bu/ac)	Marginal Product	Value of Marginal Product
90	180	--	--
100	185	0.5	$1.50
110	187	0.2	$0.60
120	188	0.1	$0.30

11a) (2 pts.) Use this table to show how to calculate the Marginal Product and then fill in the Marginal Product column in the table. Show your work for <u>potential</u> partial credit.

$MP = \Delta Q/\Delta X = (185 - 180)/(100 - 90) = 5/10 = 0.5$

11b) (2 pts.) Corn sells for $3.00/bu. Show how to calculate the Value of Marginal Product for one example, and then fill in the Value of Marginal Product column in the table.

$VMP = P \ x \ MP = \$3 \ x \ 0.5 = \$1.50$

11c) (2 pts.) If nitrogen costs $0.60 per pound, what is the profit maximizing amount to apply based on the table above (you may need to interpolate between entries)?

VMP = input price, here = $0.60, which occurs at Nitrogen = 110 pounds/acre

12) (10 pts) Corn yield is $Y = 150 + 4W - 0.02W^2$, where Y is yield (bu/ac) and W is irrigation water (inches/ac). If the price of corn is $3.00/bu and water costs $10/inch, what is the profit maximizing amount of water to apply? **<u>Don't Forget to Check the Second Order Condition.</u>**

Set up profit: $\pi = p*f(x) - r*x = 3(150 + 4W - 0.02W^2) - 10W$
FOC $d\pi/dW = 3(4 - 0.04W) - 10 = 0$
Solve FOC for X: $12 - 0.12W = 10$
                  $2 = 0.12W$ $W = 2/0.12 = $ **_16.67 inches_**
SOC: $d^2\pi/dW^2 = -0.12 < 0$, which satisfies SOC for maximum

13) (8 pts. total) The table below reports the cost of producing duck eggs on your farm.

Eggs (dozens/year)	Fixed Cost	Variable Cost	Total Cost	Marginal Cost	Average Total Cost
15,000	10,000	83,000	*93,000*	--	*6.20*
18,000	10,000	91,000	*101,000*	*2.67*	*5.61*
20,000	10,000	99,000	*109,000*	*4.00*	*5.45*
21,000	10,000	107,000	*117,000*	*8.00*	*5.57*

13a) (3 pts.) Using the table above, show how to calculate Total Cost, Marginal Cost & Average Total Cost, then fill in the table's missing values. Show your work for <u>potential</u> partial credit.

> *TC = FC + VC = 10,000 + 83,000 = $93,000*
> *MC = ΔTC/ΔQ = (101,000 – 93,000)/(18,000 – 15,000) = 8,000/3,000 = $2.67*
> *ATC = TC/Q = 93,000 / 15,000 = $6.20*

13b) (2 pts.) Based on the information in the table, what is the profit maximizing number of duck eggs (dozens) to produce each year if a dozen sell for $4.00 each?

> *Price = MC, here = $4.00, which occurs at Q = 20,000 dozen duck eggs/year*

13c) (3 pts.) Based on your Average Total Cost numbers in the table, if the farm produces and sells this many dozens per year, will it earn a positive economic profit? How do you know?

> *No, because the price ($4.00) is less than the average total cost of $5.45.*

14) (14 pts. total) In 2016 you bought a used tractor for **$120,000**.
14a) (2 pts.) For your internal farm accounting you plan to keep the tractor for 4 years. Calculate annual depreciation for the tractor assuming a **$40,000 salvage value**. Fill in the table using **Straight Line Depreciation**. Show your work for potential partial credit.

Year	Depreciation During Year	Value at Year End
2016	*$20,000*	*$100,000*
2017	*$20,000*	*$80,000*
2018	*$20,000*	*$60,000*
2019	*$20,000*	*$40,000*

> *Deprec = 1/UsefulLife(Price – SalvageValue) = (1/4)*(120,000 – 40,000) = 20,000*

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14b) (2 pts.) You have been depreciating the tractor you bought for $120,000 for tax purposes using the IRS tax table below. Enter depreciation claimed in 2016 and 2017 in the table below.

Year	Tax Year	Depreciation Rate	Depreciation Claimed	Basis at year end
1	2016	25.00%	$120,000 x 25.00% = $30,000	$120,000 – $30,000 = $90,000
2	2017	21.43%	$120,000 x 21.43% = $25,716	$90,000 – $25,716 = $64,284
3	2018	15.31%		
4	2019	10.93%		
5	2020	8.75%		
6	2021	8.74%		
7	2022	8.75%		
8	2023	1.09%		

14c) (2 pts.) What was your income tax basis in the tractor at the beginning of 2018?

Basis = purchase price – total depreciation claimed = $120,000 – $30,000 – $25,716 = $64,284

14d) (2 pts.) If you decided to sell the tractor at the beginning of 2018 for $70,000, how much gain or loss would you report on your income tax return?

Gain = sale price – basis = $70,000 – $64,284 = $5,716

For parts e though g below, rather than using the table in part b, suppose instead you chose the Section 179 election and deducted the full cost of the tractor for your 2016 taxes.

14e) (2 pts.) What is your income tax basis in the tractor at the beginning of 2018?

Basis = Purchase Price – Depreciation Claimed = $0   ZERO BASIS!

14f) (2 pts.) If you sold the tractor at the beginning of 2018 for $70,000, how much gain or loss would you report on your income tax return? Which of the following taxes would be owed for this gain: ordinary income, self-employment, and/or capital gains?

Gain = sale price – basis = $70,000 – $0 = $70,000
Depreciation recapture is only subject to Ordinary Income Tax

14g) (2 pts.) Briefly explain the tax benefit that farmers gain by choosing the Section 179 election for depreciating purchased machinery like this tractor.

*In short-term, reduce your taxable income by the amount you claim (here $120,000), which may put you in a lower tax bracket for some of your income, and also delays any taxes due to the future years. In longer term, **you avoid paying the self-employment tax of 15.3%**, since when you do sell the asset, the gain is only taxed as ordinary income, but the avoided taxes when you first claimed the deduction reduced both ordinary income and self-employment taxes.*

15) (12 pts. total) Use the simplified Balance Sheet and Income Statement below to answer these questions. Show your work for <u>potential</u> partial credit.

BALANCE SHEET	1/1/2018	1/1/2017		1/1/2018	1/1/2017
Current Assets	410,000	480,000	Current Liabilities	350,000	320,000
Non-Current Assets	2,100,000	2,000,000	Non-Current Liabilities	650,000	660,000
			Total Liabilities	1,000,000	980,000
			Equity	1,510,000	1,500,000
Total Assets	2,510,000	2,480,000	Total Liabilities and Equity	2,510,000	2,480,000

15a) (2 pts.) What is the Current Ratio on 1/1/**2018**?

*CR = current assets/current liabilities = 410,000 / 350,000 = **1.17***

15b) (2 pts.) What is the Debt to Asset Ratio on 1/1/**2018**?

*D to A = total liabilities / total assets = 1,000,000 / 2,510,000 = **0.398***

INCOME STATEMENT 1/1/2017 to 12/31/2017

Crop and Livestock Sales	1,060,000
Operating Expenses	860,000
Interest Expenses	70,000
Net Farm Income from Operations	130,000

Assume the farm family paid themselves $100,000 for their labor & management.

15c) (2 pts.) What is this farm's Return on Assets?

*ROA = NFIfO + Interest – UnpaidLabrMgmt = 130,000 + 70,000 – 100,000 = **100,000***

15d) (2 pts.) What is this farm's Rate of Return on Assets?

*ROROA = ROA/Avg Assets = 100,000 / ½(2,510,00 + 2,480,000) = **4.01%***

15e) (2 pts.) What is this farm's Return on Equity?

*ROE = ROA – Interest = 100,000 – 70,000 = **30,000***

15f) (2 pts.) What is this farm's Rate of Return on Equity?

*ROROE = ROE/Avg Equity = 30,000 / ½(1,510,00 + 1,500,000) = **1.99%***