AAE 320 Fall 2015 Final Exam Name: KEY

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

a) T___ F_**X**_ Wisconsin's dairy industry maybe important in the U.S., but production in New York far exceeds WI production.

b) T___ F_**X**_ Most Wisconsin corn and soybean growers insure their crops using Yield Protection (YP) with a 60%-80% coverage level.

c) T_**X**_ F___ Based on lecturers in class, the cost of production for many corn and soybean farmers exceeds current and long-term prices.

d) T_**X**_ F___ Data show that most farmers managing small farms (<$250,000 in gross revenue) have not done well in recent years, earning low farm income.

e) T_**X**_ F___ With the new Farm Bill, most subsidies to farmers now come as crop insurance premium subsidies, not commodity support payments.

f) T_**X**_ F___ Based on class lecture, most farm households, both large and small, have significant off-farm income from other jobs.

g) T_**X**_ F___ The Dairy Margin Protection Program is the new support program protecting farmers from declines in milk prices relative to feed costs.

h) T_**X**_ F___ Based on lecturers in class, many farmers can expect more paperwork and record keeping to satisfy sustainability requirements.

i) T_**X**_ F___ Life Cycle Assessments typically estimate the average amount of energy and water needed to produce, use and dispose of a consumer product.

j) T_**X**_ F___ SCO (Supplemental Coverage Option) insurance is a new policy from the 2014 Farm Bill that lets farmers insure part of their RP deductible.

2) (17 pts. total) For the questions below, assume you are a farmer.

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 Agricultural Risk Coverage (County ARC) payments?

Operate land with corn base acres

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

National Marketing Year Average Price less than $3.70 Reference Price.

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) (5 pts.) If you are a farmer, where do you go to sign up/enroll or buy each of the following?

Action	USDA Farm Service Agency	Crop Insurance Agent
Revenue Protection (RP)		XX
Agriculture Risk Coverage (ARC)	XX	
Area Revenue Protection (ARP)		XX
Price Loss Coverage (PLC)	XX	
Supplemental Coverage Option (SCO)		XX

Mark the boxes to indicate your answers to the following questions.

2c) (3 pts.) Suppose you have a farm with 20 corn base acres enrolled in County ARC. For each action below, would you Keep or Lose your eligibility for a corn County ARC Payment?

Action	Keep	Lose
Plant the whole farm in soybeans (a program crop)	XX	
Plant the whole farm in alfalfa (a non-program crop)	XX	
Convert the whole farm into a rural airport (a non-ag use)		XX

2d) (3 pts.) Suppose you have 20 corn base acres enrolled in PLC. For each action below, would you Keep or Lose your eligibility for a corn PLC Payment? (The corn Reference Price is $3.70).

Action	Keep	Lose
Plant the whole farm in corn and sell it for $3.50/bu	XX	
Plant the whole farm in corn and sell it for $4.10/bu	XX	
Plant the whole farm in cabbage and to sell for sauerkraut		XX

3) (12 pts. total) Answer the questions below, assuming you grew 20,000 bushels of soybeans and bought another 10,000 bushels, all to process and feed to your dairy cows.

3a) (3 pts.) Suppose you want to get a Marketing Assistance Loan (MAL), which of the following options are you eligible for? (Mark **ALL** options that are possible)

A___ Get a MAL using only the 10,000 bu of purchased soybeans as collateral
B___ Get a MAL using all 30,000 bu as collateral
C_**X**_ Get a MAL using 15,000 bu of the 20,000 bu of soybeans you grew as collateral
D_**X**_ Get a MAL using only the 20,000 bu of soybeans you grew as collateral
E___ None of these options, you are not eligible for a MAL
F___ All of these options are possible for a MAL

3b) (3 pts.) If you are eligible and the soybean loan rate is $5.00/bu, what is the maximum Marketing Assistance Loan could you get?

20,000 bu x $5.00/bu = $100,000

3c) (3 pts.) If you took out the maximum MAL for your soybeans, for which of the following cases would you receive a Loan Deficiency Payment? (Mark **ALL** that are correct)

A_**X**_ Pay back the MAL when the posted county price is less than the $5.00 loan rate
B___ Pay back the MAL when the posted county price is greater than the $5.00 loan rate
C___ Pay back the MAL on May 1 when the posted county price is $5.50, but sell the soybeans on June 1 for $4.80/bu
D_**X**_ Pay back the MAL on May 1 when the posted county price is $4.80, but sell the soybeans on June 1 for $5.50/bu
E___ You would receive a Loan Deficiency Payment under all of these conditions
F___ You would receive a Loan Deficiency Payment under none of these conditions

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

It's a low interest loan to manage cash flow issues, such as to pay back an operating loan due right after harvest, so you can hold the grain and sell later when prices tend to be higher.

4) (10 pts. total) Suppose a farm has a 70 ac field of corn in one insured unit with an average yield of 180 bu/ac as established by crop insurance rules.

4a) (4 pts.) Suppose the farmer buys 80% Yield Protection (YP) crop insurance. What is the per acre yield guarantee? What is the total yield guarantee for the 70 ac unit?

180 bu/ac x 0.80 = 144 bu/ac
144 bu/ac x 70 ac = 10,080 bu

4b) (4 pts.) Suppose the farmer were to actually harvest a yield of 140 bu/ac from the unit. How many bushels would the farmer harvest from the unit? What would be the insurance indemnity, if any, assuming a 100% price election of $3.70/bu?

140 bu/ac x 70 ac = 9,800 bu
10,080 – 9,800 = 280 bu x $3.70/bu = $1,036

4c) (2 pts.) Suppose the farmer actually were to sell the harvested corn for $3.50/bu in April. How much would the crop insurance indemnity change?

Not at all

5) (12 pts. total) Suppose a farm has a 110 ac field of soybeans in one insured unit with an average yield of 45 bu/ac as established by crop insurance rules and a $9.00/bu Base Price.

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 110 acre unit?

45 bu/ac x $9.00/bu x 0.80 = $324/ac
$324/ac x 110 ac = $35,640

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 110 acre unit?

With a price decrease, there is no change in the guarantee, it stays at $35,640 for the unit.

5c) (2 pts.) Suppose the farmer actually harvests 4,400 bushels of soybeans from the unit, what would be the insurance indemnity, if any?

Actual revenue = 4,400 bu x $8.00/bu = $35,200
Indemnity = $35,640 - $35,200 = $440

For 5d and 5e, the price increases over the season so that the official Harvest Price is $10.00/bu.

5d) (2 pts.) What is the final revenue guarantee for the 110 acre unit?

With a price increase, the guarantee increases: 45 bu/ac x $10.00/bu x 0.80 = $360/ac
$360/ac x 110 ac = $39,600

5e) (2 pts.) Suppose the farmer actually harvests 4,400 bushels of soybeans from the unit, what would be the insurance indemnity, if any?

Actual revenue = 4,400 bu x $10.00/bu = $44,000
Indemnity: $44,000 > $39,600, so ***no indenity***

6 (10 pts. total) Answer the following questions about crop insurance policy.
The federal government subsidizes crop insurance, paying about two-thirds of the "actuarially fair" premium for most farmers, so that, from a farmer's perspective, the loss ratio is about 3.0 while the program loss ratio is around 1.0.
6a) (4 pts.) Explain the actuarially fair premium? For context, what is the actuarially fair premium for a policy that pays $100/ac once every 5 years and $0/ac the other 4 years?

The premium that "breaks even:" on average – pays as much in indemnities as receives in premiums on average. For a policy that pays $100 once every 5 years and zero otherwise, the fair premium is 1/5 of $100 = $20/acre.

6b) (4 pts.) Explain what a farmer loss ratio of 3.0 means in terms of expected average returns from buying crop insurance. For context, what does a farmer loss ratio of 3.0 mean in terms of an average indemnity for a policy that costs $5 per acre?

A loss ratio of 3.0 means that on average, across farmers and years, farmers will receive $3.00 in indemnities for every $1.00 they spend on premiums. Thus if the premium costs $5/ac, a 3.0 loss ratio means indemnities average $15/ac across farmers and years.

6c) (2 pts.) In class, we saw maps of corn and soybean loss ratios by county across the Midwest. Which counties tended to have high loss ratios, counties with high average yields like Dane County or those with low average yields like Ashland County in northern Wisconsin?

Counties with low average yields like Ashland County tended to have high loss ratios.

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

County average yield announced by USDA-NASS below the county guarantee the farmer choses.

7b) (4 pts.) You insure 200 acres of corn under an Area Revenue Protection (ARP) crop insurance policy in Smith County with a 90% coverage level. The county revenue guarantee is 90% x 170 bu/ac x $3.50/bu = $535.50/ac. If actual county yield is 140 bu/ac and the harvest price is $3.60, what would be the total insurance indemnity for your corn acres?

Final revenue guarantee = 90% x 170 bu/ac x max($3.50, $3.60) = $550.80/ac
Actual county revenue = 140 bu/ac x $3.60 = $504/ac
Indemnity per acre = $550.80 – $504.00 = $46.80/ac
Total Indemnity = $46.80/ac x 200 ac = ***$9,360***

7c) (4 pts.) How does each event below affect the corn ARP indemnity?

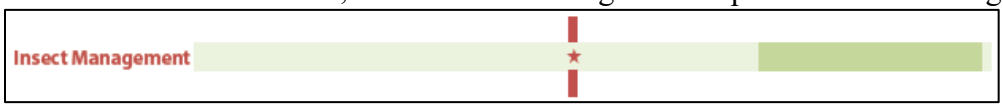
Event	Not at All	Lose Indemnity
Harvest 170 bu/ac from your corn acres	XX	
Sell your harvested corn for $3.80/bu	XX	
You are hit by hail and lose 75% of your yield	XX	
Sell your harvested corn for $3.30/bu	XX	

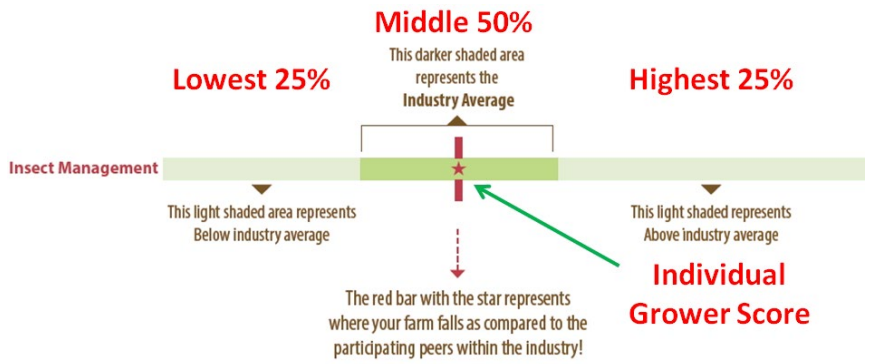
8a) (3 pts.) Sustainability is commonly referred to as having three main elements or aspects. As discussed in class, which of the following name those three elements (Mark all that are correct).

A___ Energy, Equality and Environment
B_**X**_ Social, Economic, and Environmental
C___ Society, Science, and Satisfaction
D_**X**_ People, Profit and Planet
E___ Personnel, Practices, and Profits

In class, we looked at an example "Sustainability Dashboard" that presented results from a PCA + DEA analysis of farmer practice adoption intensity. **Figure A** below is an example for Insect Management from an actual assessment, while below it is a general explanation of these figures.

Figure A





8b) (3 pts.) Based on **Figure A**, how is this farmer doing relative to his peers: above average, below average or about average? How do you know?

This farmer is <u>below average</u>, because his star/bar is to the <u>left of the dark band</u> indicating the industry average.

8c) (3 pts.) Use **Figure A** to comment on how the farmer population as a whole doing. Do most of the farmers use the recommended insect management practices or not? How do you know?

Most farmers use the recommended practices because the dark band indicating the industry average is far to the right, meaning many farmers have high scores.

9) (6 pts. total) Answer the following questions about business entities and liability.

9a) (2 pts.) Which business entities discussed in class (sole proprietor, partnership, C and S-corporations, limited liability company) must 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

9b) (2 pts.) Which business entities discussed in class (sole proprietor, partnership, C and S-corporations, limited liability company) provide some limited liability to the owners?

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

9c) (2 pts.) When we say these entities have "limited liability" what is meant – liability for <u>what</u> is limited? <u>Be brief</u>.

Limited liability means personal assets of owners cannot be used to pay the financial debts of the business entity, only the entity's assets. The owners' financial liability is limited to the assets they have invested in the entity.

10) (16 pts. total) Provide short answers to each of the following questions. Jon and Bob own a farm, with all assets owned as marital property with a right of survivorship under Wisconsin's marital property law. They have a son Mike. Among their assets is land worth $800,000 with a tax basis of $200,000 and $100,000 of corn grain with a $0 tax basis (they raised it). Answer each question below. <u>Give a brief explanation for each answer.</u>

10a) (2 pts.) If Jon and Bob gave the land and grain to Mike, what is Mike's income tax basis in the land and in the corn?

Basis transfers with gift, so land has a $200,000 basis and grain a $0 basis.

10b) (2 pts.) If Mike then sells the land for $800,000 and the corn for $100,000, how much gain must he report?

Gain – Selling Price – Basis
Land: $800,000 – $200,000 = $600,000
Grain: $100,000 – $0 = $100,000

10c) (2 pts.) Considering ordinary income tax, capital gain tax, and self-employment tax, which one or ones of these taxes would Mike owe on this gain from the land sale? Which one or ones of these taxes would Mike owe on this gain from the grain sale?

Land: owe only capital gains tax
Grain: owe ordinary income and self-employment tax

10d) (2 pts.) If Jon died and then Bob gave the land to Mike, how much gain would Mike have to report if he sold the land soon thereafter for $800,000 and the grain for $100,000?

On death of Jon, basis updates to date of death fair market value or $800,000 and $100,000. When Bob gives assets to Mike, basis transfer with gift. Gain = selling price minus basis, which would equal zero. ***He would report no Gain****.*

10e) (1 pts.) If Jon did not die, but instead Jon and Bob contributed the land to a Limited Liability Company (LLC) that the two of them completely owned and the next day their LLC sold the land for $800,000, how much gain would the LLC realize?

Basis transfers when contribute assets to LLC, so gain = selling price – basis = $500,000

10f) (1 pts.) Assume the LLC realizes gain from the sale, does it pay income tax on the gain? Do Jon and Bob (sole owners of the LLC) pay income tax on the gain?

LLC does not pay taxes, but passes income on to owners in proportion to their shares, so Jon and Amy would owe income tax (here only capital gains tax).

10g) (1 pts.) Instead of selling the land, the LLC returns it back to Jon and Bob. Does the LLC and/or Jon and Bob have to pay income tax as a result of this transfer?

No, removing assets from LLC does not trigger recognition of gain

10h) (1 pts.) Instead Jon and Bob contributed the land to a C-Corporation that the two of them completely owned and the next day their Corporation sold the land for $800,000, how much gain would the Corporation realize?

Basis transfers when contribute assets to C Corporation, so gain = selling price – basis = $600,000

10i) (2 pts.) Assume the Corporation realizes gain from the sale, does it pay income tax on the gain? Do Jon and Bob (sole owners of the Corporation) pay income tax on the gain?

Yes, C Corporations pay taxes on gains then pass remaining gains to shareholders.
Yes, shareholders of C Corporations (Jon and Bob) pay taxes on any gains distributed to them.

10j) (2 pts.) Instead of selling the land, the Corporation returns it back to Jon and Bob. Does the Corporation and/or Jon and Bob have to pay income tax as a result of this transfer?

Transfer of assets out of a C Corporation triggers recognition of gain, so both the C corporation and Jon & Bob pay taxes.

11) (6 pts. total) You are deciding the potassium fertilizer for your corn crop. This table gives the potassium fertilizer applied in pounds per acre and the corn yield (bu/ac).

Potassium (lbs/ac)	Yield (bu/ac)	Marginal Product	Value of Marginal Product
40	195	--	--
50	200	0.5000	$2.00
60	202	0.2000	$0.80
70	203	0.1000	$0.40

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 potential partial credit.

MP = ΔQ/ΔX = (200 – 195)/(50 – 40) = 15/10 = 0.5

11b) (2 pts.) Corn sell for $4.00/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 = $4 x 0.5 = $2.00/bu

11c) (2 pts.) If potassium fertilizer 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 potassium = 65 lbs, halfway between VMP of 0.80 and 0.40

12) (10 pts) Corn yield is $Y = 100 + 2X – 0.01X^2$, where Y is yield (bu/ac) and X is nitrogen fertilizer (lbs/ac). If the price of corn is $4.00/bu and nitrogen fertilizer costs $0.50/lb, what is the profit maximizing amount of nitrogen fertilizer to apply? **Don't Forget to Check the Second Order Condition.**

Set up profit: $\pi = p*f(x) – r*x = 4(100 + 2X – 0.01X^2) – 0.5X$
FOC $d\pi/dX = 4(2 – 0.02X) – 0.5 = 0$
Solve FOC for X: $8 – 0.08X = 0.5$
$7.5 = 0.08X \quad X = 7.5/0.08 =$ ***93.75 lbs***
SOC: $d^2\pi/dX^2 = – 0.08 < 0$, *which satisfies SOC for maximum*

13) (8 pts. total) This table reports the costs ($/week) to produce chickens (number/week).

Chickens	Fixed Cost	Variable Cost	Total Cost	Marginal Cost	Average Total Cost
150	300	750	1,050	---	7.00
160	300	800	1,100	5.00	6.88
170	300	860	1,160	6.00	6.82
180	300	940	1,240	8.00	6.89

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 potential partial credit.

TC = FC + VC = 300 + 750 = 1050
MC = ΔTC/ΔQ = (1100 – 1050)/(160 – 150) = 50/10 = 5.0

13b) (2 pts.) Based on the information in the table, what is the profit maximizing number of chickens to produce each week if chickens sell for $7.00 each?

Price = MC, here = $7.00, which occurs at chickens Q = 175, halfway between Q of 170 and 180

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

At Q = 175, average total cost will be roughly halfway between $6.82 and $6.89 (about $6.86). Thus the farm will earn positive profit because ATC < the price P.

14) (14 pts. total) In 2013 you bought a tractor for **$150,000**.
14a) (2 pts.) For your farm accounts you plan to keep the tractor for 4 years. Calculate annual depreciation for the tractor assuming a **$50,000 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
2013	*$25,000*	*$150,000 – $25,000 = $125,000*
2014	*$25,000*	*$100,000*
2015	*$25,000*	*$75,000*
2016	*$25,000*	*$50,000*

Deprec = 1/UsefulLife(Price – SalvageValue) = (1/4)(150,000 – 50,000) = 25,000*

14b) (2 pts.) You have been depreciating the tractor you bought for $150,000 for tax purposes using the IRS tax table below. Enter depreciation claimed in 2013 and 2014 in the table below.

Year	Tax Year	Depreciation Rate	Depreciation Claimed
1	2013	25.00%	*$150,000 x 25.00% = $37,500*
2	2014	21.43%	*$150,000 x 21.43% = $32,145*
3	2015	15.31%	
4	2016	10.93%	
5	2017	8.75%	
6	2018	8.74%	
7	2019	8.75%	
8	2020	1.09%	

14c) (2 pts.) What is your income tax basis in the tractor at the beginning of 2015?

Basis = purchase price – total depreciation claimed = 150,000 – 37,500 – 32,145 = $80,355

14d) (2 pts.) If you sold the tractor at the beginning of 2015 for $90,000, how much gain or loss would you report on your income tax return?

Gain = sale price – basis = $90,000 – $80,355 = $9,645

For parts e though g below, rather than using the table in part a, suppose instead you chose the Section 179 election and deducted the full cost of the tractor for your 2013 taxes.

14e) (2 pts.) What is your income tax basis in the tractor at the beginning of 2015?

$0 because it has been fully depreciated

14f) (2 pts.) If you sold the tractor at the beginning of 2015 for $90,000, 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 = $90,000 – $0 = $90,000

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, which may put you in a lower tax bracket for some of your income, also delays any taxes due to the future years. In longer term, ***you avoid paying the self-employment tax****, since when do sell asset, the gain is only taxed as ordinary income, but the avoided taxes when 1st claimed the deduction reduced both ordinary income and self-employment taxes due.*

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

BALANCE SHEET	12/31/2014	12/31/2013
Current Assets	320,000	300,000
Non-Current Assets	680,000	630,000
Total Assets	1,000,000	930,000

	12/31/2014	12/31/2013
Current Liabilities	190,000	180,000
Non-Current Liabilities	380,000	360,000
Total Liabilities	570,000	540,000
Equity	430,000	390,000
Total Liabilities and Equity	1,000,000	930,000

15a) (2 pts.) What is the Current Ratio on 12/31/**2014**?

CR = current assets/current liabilities = 320,000 / 190,000 = 1.68

15b) (2 pts.) What is the Debt to Asset Ratio on 12/31/**2014**?

D:A = total liabilities / total assets = 570,000 / 1,000,000 = 0.570

INCOME STATEMENT 12/31/2013 to 12/31/2014

Crop and Livestock Sales	320,000
Operating Expenses	180,000
Interest Expenses	30,000
Net Farm Income from Operations	110,000

Assume the farm family paid themselves $70,000 for their labor & management.

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

ROA = NFIfO + Interest – UnpaidLabrMgmt = 110,000 + 30,000 – 70,000 = ***70,000***

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

ROROA = ROA/Avg Assets = 70,000 / ½(1,000,00 + 930,000) = ***7.25%***

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

ROE = ROA – Interest = 70,000 – 30,000 = ***40,000***

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

ROROE = ROE/Avg Equity = 40,000 / ½(430,00 + 390,000) = ***9.76%***