

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

- a) T X F \_\_\_ Wisconsin is the world's largest cranberry production region, producing almost half of global production.
- b) T X F \_\_\_ Most Wisconsin corn and soybean growers insure their crops using Revenue Protection (RP) with a 70%-80% coverage level.
- c) T X F \_\_\_ Based on class lectures, many US corn and soybean farmers are losing money since their cost of production exceeds current and near-term prices.
- d) T \_\_\_ F X \_\_\_ USDA data presented in class show that most small farmers (<\$250,000 in gross revenue) have done well in recent years, earning high farm income.
- e) T X F \_\_\_ Crop insurance premiums are subsidized so that most farmers pay less than half of the actuarially fair premium.
- f) T X F \_\_\_ Based on class lectures, crop insurance has become the primary way that the government supports commodity crop farmers.
- g) T X F \_\_\_ The Dairy Margin Protection Program is a USDA support program protecting farmers from declines in milk prices relative to feed costs.
- h) T X F \_\_\_ Based on class lecture, my sustainability research emphasizes farmer engagement and adoption of science-based practices.
- i) T \_\_\_ F X \_\_\_ Based on our Let's Talk About It on Beginning Farmers, common advice was to invest heavily up front: "Start big or don't start at all!"
- j) T X F \_\_\_ The "Harvesting Tax Losses" article handed out in class reminds farmers to use income losses in a bad year to reduce taxes paid in previous years.

2) (16 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 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) (4 pts.)** If you are a farmer, where do you go to sign up/enroll or buy each of the following?

Action	Crop Insurance Agent	USDA Farm Service Agency
Agriculture Risk Coverage (ARC)		<b>XX</b>
Revenue Protection (RP)	<b>XX</b>	
Price Loss Coverage (PLC)		<b>XX</b>
Area Revenue Protection (ARP)	<b>XX</b>	

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

**2c) (3 pts.)** Suppose you have a farm with 15 soybean base acres enrolled in County ARC. For each item below, would you Keep or Lose your eligibility for a soybean County ARC Payment?

Action	Keep	Lose
Plant the whole farm in soybean	<b>XX</b>	
Plant the whole farm in alfalfa	<b>XX</b>	
Convert the land into a rural housing development		<b>XX</b>

**2d) (3 pts.)** Suppose you own 15 soybean base acres enrolled in PLC with a Reference Price of \$8.40. For each action below, place an X in the box indicating how it would change your soybean PLC payment.

Action	Increase	Decrease	No Change
Plant soybeans on the land and sell them for \$8.50/bu			<b>XX</b>
Plant soybeans on the land and sell them for \$8.00/bu			<b>XX</b>
Plant potatoes on the land and sell them for chips		<b>XX</b>	

**3) (17 pts. total)** Answer the questions below. Assume your farm has 100 corn base acres with a payment yield of 150 bu/ac (100 x 150 = 15,000 bu of corn), but you actually you grew 20,000 bushels of corn, plus bought another 10,000 bushels, all to feed to your hogs.

**3a) (5 pts.)** Suppose you want to get a Marketing Assistance Loan (MAL). Place an X by **ALL** of the following options that are possible?

- A \_\_\_ Get a MAL using all 30,000 bu you actually own as collateral
- B \_\_\_ Get a MAL using the 15,000 bu of corn calculated for your base acres as collateral
- C **XX** Get a MAL using only the 20,000 bu of corn you actually grew as collateral
- D **XX** Get a MAL using 15,000 of the 20,000 bu of corn you actually grew as collateral
- E \_\_\_ None of these options, you are not eligible for a MAL

**3b) (3 pts.)** Assuming you are eligible and the corn loan rate is \$1.90/bu, what is the maximum Marketing Assistance Loan could you get?

$$20,000 \text{ bu} \times \$1.90/\text{bu} = \$38,000$$

**3c) (6 pts.)** Suppose you took out the maximum MAL for your corn. Place an X by ALL of the following cases in which you would receive a Loan Deficiency Payment.

- A  Pay back the MAL when the posted county price is less than the \$1.90 loan rate
- B  Pay back the MAL when the posted county price is greater than the \$1.90 loan rate
- C  Pay back the MAL when the National Marketing Year Average Price is less than the loan rate
- D  Pay back the MAL when the National Marketing Year Average Price is less than the Reference Price
- E  Pay back the MAL when the Chicago Mercantile Price is less than the loan rate
- 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?

*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 you can hold the grain and sell later when prices tend to be higher.*

**4) (10 pts. total)** Suppose a farm has 150 acres of corn in one insured unit with an average yield of 170 bu/ac as established by crop insurance rules.

**4a) (4 pts.)** Suppose the farmer buys 70% Yield Protection (YP) crop insurance. What is the per acre yield guarantee? What is the total yield guarantee for the 150 ac unit?

$$70\% \times 170 \text{ bu/ac} = 119 \text{ bu/ac}$$
$$119 \text{ bu/ac} \times 150 \text{ ac} = 17,850 \text{ bu}$$

**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 \$3.50/bu?

$$140 \text{ bu/ac} \times 150 \text{ ac} = 21,000 \text{ bu}$$

*21,000 actual yield > 17,850 yield guarantee, so NO INDEMNITY*

**4c) (2 pts.)** Suppose the farmer actually were to sell the harvested corn for \$3.00/bu in April. How much would the crop insurance indemnity change?

*Not at all! Actual sale price does not affect indemnities*

**5) (12 pts. total)** Suppose a farm has 120 acres of soybeans in one insured unit with an average yield of 50 bu/ac as established by crop insurance rules and the Base Price is \$9.00/bu.

**5a) (4 pts.)** Suppose the farm buys 75% Revenue Protection (RP) crop insurance. What is the initial per acre revenue guarantee? What is the initial revenue guarantee for the 120 acre unit?

$$75\% \times 50 \text{ bu/ac} \times \$9.00/\text{bu} = \$337.50/\text{ac}$$
$$\$337.50/\text{ac} \times 120 \text{ ac} = \$40,500$$

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 120 acre unit?

*The final guarantee is calculated with the maximum of the initial Base Price and the Harvest Price. With a price decrease, there is no change in the guarantee, it stays at \$40,500.*

**5c) (2 pts.)** Suppose the farmer actually harvests 4,800 bushels of soybeans from the unit, what would be the insurance indemnity, if any?

$$\text{Actual revenue} = 4,800 \text{ bu} \times \$8.00/\text{bu} = \$38,400$$
$$\text{Indemnity} = \$40,500 - \$38,400 = \$2,100$$

For 5d to 5f, 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 120 acre unit?

*The final guarantee is calculated with the maximum of the initial Base Price and the Harvest Price. With a price increase, the guarantee becomes  $75\% \times 50 \text{ bu/ac} \times \$10.00/\text{bu} = \$375.00/\text{ac} \times 120 \text{ ac} = \$45,000$*

**5e) (2 pts.)** Suppose the farmer actually harvests 4,800 bushels of soybeans from the unit, what would be the insurance indemnity, if any?

$$\text{Actual revenue} = 4,800 \text{ bu} \times \$10.00/\text{bu} = \$48,000$$
$$\$48,000 > \$45,000 \text{ guarantee, so Indemnity} = 0, \text{ NO INDEMNITY}$$

**5f) (2 pts.)** Suppose the farmer actually were to sell the harvested soybeans for \$8.00/bu in April. How much would the crop insurance indemnity change?

*Not at all! Actual sale price does not affect indemnities*

6 (12 pts.) Mark an X in each box to indicate which yield and price each program or policy uses.

	County Agricultural Risk Coverage	Area Revenue Protection	Revenue Protection
<u>Yield</u>			
Actual Farm			XX
County Average	XX	XX	
National Average			
<u>Price</u>			
Actual Farm			
Chicago Mercantile Exchange		XX	XX
National Marketing Year Average	XX		

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 chooses.*

7b) (4 pts.) You insure 250 acres of corn with an Area Yield Protection (AYP) crop insurance policy with a 90% coverage level. The county yield guarantee is  $90\% \times 150 \text{ bu/ac} = 135 \text{ bu/ac}$ . Actual farm yield is 130 bu/ac, actual county yield is 120 bu/ac, the price election was \$3.50/bu, but you sell the corn for \$3.60/bu. What would be the total insurance indemnity?

$$\begin{aligned} \text{Yield Loss} &= \text{County Yield Guarantee} - \text{Actual County Yield} = 135 - 120 = 15 \text{ bu/ac} \\ \text{Indemnity per acre} &= \$3.50 \times 15 \text{ bu/ac} = \$52.50 \\ \text{Total Indemnity} &= \$52.50/\text{ac} \times 250 \text{ ac} = \underline{\underline{\$13,125}} \end{aligned}$$

7c) (4 pts.) Mark an X the box indicating how each event directly affects the AYP indemnity.

Event	Increase It	Decrease It	No Change
Harvest 170 bu/ac from your corn acres			XX
Sell your harvested corn for \$3.08/bu			XX
You are flooded and lose 50% of your yield			XX
Sell your harvested corn for \$3.90/bu			XX

**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) 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*

**8b) (2 pts.)** Consider Partnerships, C-corporations, S-corporations, and Limited Liability Companies. Which of these pay taxes directly and which pass gains through to their owners?

Pay taxes on gains: C- Corporation

Pass gains through: Partnership, S-Corp, LLC

**9) (8 pts. total)** Provide short answers to these questions. Ron and Jane 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 \$500,000 with a tax basis of \$100,000 and hay worth \$50,000 with a \$0 tax basis (they raised it). Answer each question below.

**9a) (2 pts.)** If Ron and Jane sold the land to their son Mark for \$500,000 and the hay to him for \$50,000. How much gain must Ron and Jane report?

Land Gain =  $\$500,000 - \$100,000 = \$400,000$

Hay Gain =  $\$50,000 - \$0 = \$50,000$

**9b) (2 pts.)** Considering ordinary income tax, self-employment tax, and capital gain tax, which one or ones of these taxes would Ron and Jane owe on this gain from the land sale? Which one or ones of these taxes would Ron and Jane owe on this gain from the hay sale?

Taxes types owed on Land sale = Capital Gain

Taxes types owed on Hay sale = Ordinary Income, Self Employment

**9c) (2 pts.)** After Mark buys them, what is his tax basis in the land and in the hay?

Land Basis =  $\$500,000$  *The purchase price*

Hay Basis =  $\$50,000$  *The purchase price*

**9d) (2 pts.)** If Jane died and then Ron gave the land to their son Mark, how much gain would Mark have to report if he sold the land soon thereafter for \$500,000 and the hay for \$50,000?

*Basis updated to FMV on date of Jane's death, so becomes \$500,000 and \$50,000*

*Basis transfers with the gift*

*Gain = Sale Price - Basis = \$0*

**10) (9 pts.)** You are a small farmer with 300 acres of soybeans, with an average yield of 40 bu/acre and an expected soybean price of \$9/bu. You are exploring switching from conventional tillage to no-till. Currently you hire a neighbor to do tillage and planting for \$35 per acre. If you switch to no-till soybeans, the cost would fall to \$20 per acre. Your current herbicide program to control weeds costs \$32 per acre, but with no-till soybeans, you expect it to increase to \$35 per acre. Lastly, no-till soybeans do not yield as well and you expect 2% lower yields.

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

Benefits		Costs	
<u>Additional Revenues</u> What new revenue will be generated?  <i>NONE</i>		<u>Additional Costs</u> What new costs will be added?  <i>Cost of no-till planting</i> $\$20/ac \times 300 ac = \$6,000$ <i>Cost of new herbicide program</i> $\$35/ac \times 300 ac = \$10,500$	
<u>Costs Reduced</u> What costs will be eliminated?  <i>Current cost of tillage and planting</i> $\$35/ac \times 300 ac = \$10,500$ <i>Cost of current herbicide program</i> $\$32/ac \times 300 ac = \$9,600$		<u>Revenues Reduced</u> What revenues will be lost?  <i>Value of 2% yield loss</i> $2\% \times 40 bu/ac \times \$9/bu \times 300 ac = \$2,160$	
Total Benefits	$\$10,500 + \$9,600$ $= \mathbf{\$20,100}$	Total Costs	$\$6,000 + \$10,500 +$ $\$2,160 = \mathbf{\$18,660}$
Total Benefits – Total Costs = Net Benefit			$\$20,100 - \$18,660$ $= \mathbf{\$1,440}$

**b) (2 pts.)** Based on your results, considering only the money earned, is switching to no-till soybeans a money making change? Briefly explain.

*Yes, considering only the money earned, the switch is profitable by \$1,440 or \$4.80 per acre*

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

Water (inches/ac)	Yield (bu/ac)	Marginal Product	Value of Marginal Product
10	205	--	--
12	220	7.5	\$22.50
14	230	5.0	\$15.00
16	234	2.0	\$6.00

**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.

$$MP = \Delta Q / \Delta X = (220 - 205) / (12 - 10) = 15 / 2 = 7.5$$

**11b) (2 pts.)** Corn sell 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.

$$VMP = P \times MP = \$3 \times 7.5 = \$22.50/bu$$

**11c) (2 pts.)** If irrigation water costs \$15 per acre, what is the profit maximizing amount to apply based on the table above (you may need to interpolate between entries)?

$$VMP = \text{input price, here} = \$15, \text{ which occurs at water} = 14 \text{ inches}$$

**12) (10 pts)** Corn yield is  $Y = 100 + 3X - 0.01X^2$ , where Y is yield (bu/ac) and X is nitrogen fertilizer (lbs/ac). If the price of corn is \$3.00/bu and nitrogen fertilizer costs \$0.30/lb, what is the profit maximizing amount of nitrogen fertilizer to apply? **Don't Forget to Check the Second Order Condition.**

Set up profit:  $\pi = p * f(x) - r * x = 3(100 + 3X - 0.01X^2) - 0.3X$

FOC  $d\pi/dX = 3(3 - 0.02X) - 0.3 = 0$

Solve FOC for X:  $9 - 0.06X = 0.3$

$$8.7 = 0.06X \quad X = 8.7 / 0.06 = \underline{145 \text{ lbs}}$$

SOC:  $d^2 \pi / dX^2 = -0.06 < 0$ , which satisfies SOC for maximum



**13) (8 pts. total)** The table below reports the cost of producing mink for a fur farm

Mink (mink/year)	Fixed Cost	Variable Cost	Total Cost	Marginal Cost	Average Total Cost
900	5,000	83,000	88,000	---	97.78
990	5,000	91,000	96,000	88.89	96.97
1,070	5,000	99,000	104,000	100.00	97.20
1,140	5,000	107,000	112,000	114.29	98.25

**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.

$$TC = FC + VC = 5,000 + 83,000 = \$88,000$$

$$MC = \Delta TC / \Delta Q = (96,000 - 88,000) / (990 - 900) = 8,000 / 90 = \$88.89$$

$$ATC = TC / Q = 88,000 / 900 = \$97.78$$

**13b) (2 pts.)** Based on the information in the table, what is the profit maximizing number of mink to produce each year if mink sell for \$100 each?

$$Price = MC, \text{ here} = \$100, \text{ which occurs at } Q = 1,070 \text{ mink}$$

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

*Yes, because the price (\$100) is greater than the average total cost of \$97.20.*

**14) (14 pts. total)** In 2014 you bought a tractor for **\$80,000**.

**14a) (2 pts.)** For your farm accounts you plan to keep the tractor for 4 years. Calculate annual depreciation for the tractor assuming a **\$20,000 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
2014	\$15,000	\$65,000
2015	\$15,000	\$50,000
2016	\$15,000	\$35,000
2017	\$15,000	\$20,000

$$\text{Deprec} = 1/\text{UsefulLife}(\text{Price} - \text{SalvageValue}) = (1/4) * (80,000 - 20,000) = 15,000$$

**14b) (2 pts.)** You have been depreciating the tractor you bought for \$80,000 for tax purposes using the IRS tax table below. Enter depreciation claimed in 2014 and 2015 in the table below.

Year	Tax Year	Depreciation Rate	Depreciation Claimed
1	2014	25.00%	$\$80,000 \times 25.00\% = \$20,000$
2	2015	21.43%	$\$80,000 \times 21.43\% = \$17,144$
3	2016	15.31%	
4	2017	10.93%	
5	2018	8.75%	
6	2019	8.74%	
7	2020	8.75%	
8	2021	1.09%	

**14c) (2 pts.)** What was your income tax basis in the tractor at the beginning of 2016?

$$\text{Basis} = \text{purchase price} - \text{total depreciation claimed} = 80,000 - 20,000 - 17,144 = \$42,856$$

**14d) (2 pts.)** If you sold the tractor at the beginning of 2016 for \$50,000, how much gain or loss would you report on your income tax return?

$$\text{Gain} = \text{sale price} - \text{basis} = \$50,000 - \$42,856 = \$7,144$$

**For parts e through 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 2014 taxes.**

**14e) (2 pts.)** What is your income tax basis in the tractor at the beginning of 2016?

$$\text{Basis} = \text{Sale Price} - \text{Depreciation Claimed} = \$0 \quad \text{ZERO BASIS!}$$

**14f) (2 pts.)** If you sold the tractor at the beginning of 2016 for \$50,000, 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?

$$\text{Gain} = \text{Sale Price} - \text{Basis} = \$50,000 - 0 = \$50,000$$

*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, 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 of 15.3%**, since when you do sell asset, the gain is only taxed as ordinary income, but the avoided taxes when 1<sup>st</sup> 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.

<b>BALANCE SHEET</b>					
	<b>1/1/2016</b>	<b>1/1/2015</b>		<b>1/1/2016</b>	<b>1/1/2015</b>
Current Assets	350,000	360,000	Current Liabilities	250,000	220,000
Non-Current Assets	1,500,000	1,700,000	Non-Current Liabilities	450,000	460,000
			Total Liabilities	700,000	680,000
			Equity	1,150,000	1,380,000
Total Assets	1,850,000	2,060,000	Total Liabilities and Equity	1,850,000	2,060,000

**15a) (2 pts.)** What is the Current Ratio on 1/1/2016?

$$CR = \text{current assets} / \text{current liabilities} = 350,000 / 250,000 = \underline{\underline{1.40}}$$

**15b) (2 pts.)** What is the Debt to Asset Ratio on 1/1/2016?

$$D:A = \text{total liabilities} / \text{total assets} = 700,000 / 1,850,000 = \underline{\underline{0.378}}$$

**INCOME STATEMENT 1/1/2015 to 12/31/2015**

Crop and Livestock Sales	740,000
Operating Expenses	810,000
Interest Expenses	60,000
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?

$$ROA = \text{Net Farm Income} + \text{Interest} - \text{Unpaid Labor \& Mgmt} = -130,000 + 60,000 - 100,000 = \underline{\underline{-170,000}}$$

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

$$ROROA = ROA / \text{Avg Assets} = -170,000 / \frac{1}{2}(1,850,000 + 2,060,000) = \underline{\underline{-8.70\%}}$$

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

$$ROE = ROA - \text{Interest} = -170,000 - 60,000 = \underline{\underline{-230,000}}$$

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

$$ROROE = ROE / \text{Avg Equity} = -230,000 / \frac{1}{2}(1,150,000 + 1,380,000) = \underline{\underline{-18.2\%}}$$