Fill in the blanks (2 points each)
1. A put option contains the right to sell a futures contract.
2. A call option contains the right to buy a futures contract.
3. A futures contract is a legally binding contract to make or take delivery of the commodity.
5. If I take a long position in the futures market, then I have bought a futures contract.
6. On Mar. 4, 2016, the March 2016 corn futures price was $3.55 per bushel. If the corn cash price was $3.25 per bushel, then the basis is $-0.30.
7. On Mar. 4, 2016, the July 2016 corn futures price was $3.64 per bushel. If a put option with a $3.60 strike price has a premium of 15 cents, what is the time value of the option?
   $0.15
8. On Mar. 4, 2016, the July 2016 corn futures price was $3.64 per bushel. If a call option with a $3.60 strike price has a premium of 18 cents, what is the intrinsic value of the option?
   $0.04

True or False (2 points each)
9. T F Basis = Cash price – Futures price
10. T F Crop insurance is subsidized by the federal government.
11. T F Put and call option premiums are set by the CME Group, the entity that runs the futures and options markets.
12. T F The main reason crops fail is disease.
13. T F Speculators have no use for the physical commodity.
14. T F A “bull” thinks prices will decline.
15. T F The last 4 soybean crops are the 4 largest soybean crops the U.S. has ever had.
16. **F**  The only person guaranteed to make money on an options trade is the broker.

**Short Answer (2 points each)**

17. How many bushels are in 10 corn futures contracts?

*50,000 bushels (10*5,000 bushels)*

18. What is the settlement price on the April 2016 live cattle futures today (March 8, 2016)?

*$137.125/cwt.*

**Short Answer (4 points each)**

19. Below are the futures prices, 9-day, and 40-day moving averages for May 2016 lean hogs.

<table>
<thead>
<tr>
<th>Date</th>
<th>Futures</th>
<th>9-Day Average</th>
<th>40-Day Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/3/2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/3/2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/3/2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/3/2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/3/2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/3/2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/3/2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/3/2016</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In looking at the 9-day versus the 40-day average:
How many buy signals have we had since last August?

*Two*

What was the last signal (buy or sell) we received?

*Buy*
20. For 2016, you have an expected corn yield of 175 bushels per acre on your farm, based on your previous corn yields. The spring time insurance price for corn is $3.86 per bushel. 

a) If you get 75 bushels per acre in 2016 and the harvest time price was $5.00 per bushel, what would be the insurance payment if you bought 80% yield insurance?

\[
\text{Insurance payment for yield insurance} = \max(0, \text{Spring price} \times (\text{Coverage level} \times \text{Expected yield} - \text{Actual yield})) \\
= \max(0, $3.86/\text{bu} \times (80\% \times 175 \text{ bu/acre} - 75 \text{ bu/acre})) \\
= \max(0, $3.86/\text{bu} \times (140 \text{ bu/acre} - 75 \text{ bu/acre})) \\
= \max(0, $3.86/\text{bu} \times 65 \text{ bu/acre}) \\
= \max(0, $250.90/\text{acre}) \\
= $250.90/\text{acre}
\]

b) If you got 75 bushels per acre in 2016 and the harvest time price was $5.00 per bushel, what would be the insurance payment if you bought 80% revenue insurance (with the harvest price option)?

\[
\text{Insurance payment for revenue insurance} = \max(0, \max(\text{Spring price, Harvest price}) \times \text{Coverage level} \times \text{Expected yield} - \text{Harvest price} \times \text{Actual yield}) \\
= \max(0, \max($3.86/\text{bu, $5.00/bu}) \times 80\% \times 175 \text{ bu/acre} - $5.00/\text{bu} \times 75 \text{ bu/acre}) \\
= \max(0, $5.00/\text{bu} \times 80\% \times 175 \text{ bu/acre} - $5.00/\text{bu} \times 75 \text{ bu/acre}) \\
= \max(0, $325.00/\text{acre}) \\
= $325.00/\text{acre}
\]

21. Name 4 of the 5 factors that affect the value of an option premium.

- Strike price of the option
- Price of the underlying futures contract for the option
- Volatility of the underlying futures
- Time to maturity
- Interest rate

22. I put on a short hedge using Nov. 2016 soybean futures on March 4. To do that did I buy or sell a futures contract?

Sell

The futures price was $8.91 per bushel. If my expected basis is -$0.50 per bushel and the broker charges me a 2 cent per bushel commission, what is my expected price under the short hedge?

\[
\text{Expected price} = \text{Futures price} + \text{Basis} - \text{Commission} \\
= $8.91 - 0.50 - 0.02 \\
= $8.39
\]
23. I purchased a Dec. 2016 corn put option with a $4.00 strike price. The premium was 42 cents. If my expected basis is -$0.20 per bushel and my broker charges me a 1 cent per bushel commission, what is my floor price with this option?

\[
\text{Floor price} = \text{Strike price} + \text{Basis} - \text{Premium} - \text{Commission}
\]
\[
= $4.00 - 0.20 - 0.42 - 0.01
\]
\[
= $3.37
\]

The Dec. 2016 corn futures prices was $3.78 when I purchased the option. What is the intrinsic value of the option?

Intrinsic value is the value of the option if we could cash it in today. For a put option, the intrinsic value is:

\[
\text{Max}(0, \text{Strike price} - \text{Futures price}) = \text{Max}(0, $4.00 - $3.78) = \text{Max}(0, 0.22) = 0.22
\]

24. If the government reports that the butter price is $2.15 per pound and the nonfat dry milk price is $0.8216 per pound, what is the Class IV Milk price?

The Class IV Milk price = (Class IV Skim Milk price * 0.965) + (Butterfat price * 3.5)

Class IV Skim Milk price = Nonfat Solids price * 9

Nonfat Solids price = (Nonfat Dry Milk price – 0.1678) * 0.99
\[
= ($0.8216 - 0.1678) * 0.99
\]
\[
= 0.6538 * 0.99
\]
\[
= 0.6473
\]

So the Class IV Skim Milk price = $0.6473 * 9 = $5.83

Butterfat price = (Butter price – 0.1715) * 1.211
\[
= ($2.15 - 0.1715) * 1.211
\]
\[
= 1.9785 * 1.211
\]
\[
= 2.3960
\]

So the Class IV Milk price = ($5.83 * 0.965) + (2.3960 * 3.5)
\[
= 5.63 + 8.39
\]
\[
= $14.02
\]
Matching (1 point each)
Answer questions matching the following action to the appropriate statement. Terms may be used more than once.

a) Sell a call option  
    b) Buy a call option  

c) Sell a put option  
    d) Buy a put option  

e) Sell a futures contract  
    f) Buy a futures contract  

25. F Receive payment into a margin account if futures price increases.

26. E Receive payment into a margin account if futures price decreases.

27. B Have the right, but not the obligation, to buy a futures contract at the strike price.

28. D Have the right, but not the obligation, to sell a futures contract at the strike price.

29. A Receive a premium, but maybe obligated to sell a futures contract at the strike price.

30. C Receive a premium, but maybe obligated to buy a futures contract at the strike price.

Long Answer (6 points each)
31. Given the data below, compute a 14-day Relative Strength Index for Nov. 2016 soybeans.

<table>
<thead>
<tr>
<th>Date</th>
<th>Futures Price</th>
<th>Up Moves</th>
<th>Down Moves</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/12/2016</td>
<td>8.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/16/2016</td>
<td>8.91</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>2/17/2016</td>
<td>8.9275</td>
<td>0.0175</td>
<td></td>
</tr>
<tr>
<td>2/18/2016</td>
<td>8.905</td>
<td></td>
<td>0.0225</td>
</tr>
<tr>
<td>2/19/2016</td>
<td>8.885</td>
<td></td>
<td>0.02</td>
</tr>
<tr>
<td>2/22/2016</td>
<td>8.915</td>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td>2/23/2016</td>
<td>8.8225</td>
<td></td>
<td>0.0925</td>
</tr>
<tr>
<td>2/24/2016</td>
<td>8.8275</td>
<td></td>
<td>0.005</td>
</tr>
<tr>
<td>2/25/2016</td>
<td>8.7675</td>
<td></td>
<td>0.06</td>
</tr>
<tr>
<td>2/26/2016</td>
<td>8.76</td>
<td></td>
<td>0.0075</td>
</tr>
<tr>
<td>2/29/2016</td>
<td>8.735</td>
<td></td>
<td>0.025</td>
</tr>
<tr>
<td>3/1/2016</td>
<td>8.70</td>
<td></td>
<td>0.035</td>
</tr>
<tr>
<td>3/2/2016</td>
<td>8.75</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>3/3/2016</td>
<td>8.78</td>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td>3/4/2016</td>
<td>8.91</td>
<td></td>
<td>0.13</td>
</tr>
<tr>
<td>Sum</td>
<td>0.3125</td>
<td>0.2625</td>
<td></td>
</tr>
</tbody>
</table>

\[
Up\ average = 0.0446 \\
Down\ average = 0.0375 \\
RSI = \frac{(Up\ average)}{(Up\ average + Down\ average)}*100 \\
= \frac{(0.0446)}{(0.0446 + 0.0375)}*100 \\
= 54.32
\]
**Margins (12 points)**

32. I am a hedger that went short on December 2016 corn on Feb. 29, 2016 at $3.7575 per bushel. The initial margin requirement is $1,100. The maintenance margin is $1,000. Fill out my margin account for one futures contract.

<table>
<thead>
<tr>
<th>Date</th>
<th>Futures Price</th>
<th>Gain/Loss</th>
<th>Margin Call</th>
<th>Account Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/29/2016</td>
<td>$3.7575</td>
<td></td>
<td>X</td>
<td>$1,100.00</td>
</tr>
<tr>
<td>3/1/2016</td>
<td>$3.7375</td>
<td>$100.00</td>
<td>X</td>
<td>$1,200.00</td>
</tr>
<tr>
<td>3/2/2016</td>
<td>$3.745</td>
<td>-$37.50</td>
<td>(-$0.0075 * 5,000)</td>
<td>$1,162.50</td>
</tr>
<tr>
<td>3/3/2016</td>
<td>$3.755</td>
<td>-$50.00</td>
<td>(-$0.01 * 5,000)</td>
<td>$1,112.50</td>
</tr>
<tr>
<td>3/4/2016</td>
<td>$3.78</td>
<td>-$125.00</td>
<td>(-$0.025 * 5,000)</td>
<td>$112.50</td>
</tr>
</tbody>
</table>

**Math and Graph (16 points, please show your work)**

33. A corn producer is using a hedge to protect against price risk. Her broker charges her a commission of 1 cent per bushel for each transaction. At the time, the Dec. 2016 corn futures price was $3.78. She expects a harvest time basis of -$0.25 per bushel.

Please graph the relevant cash price, futures return, and net price lines.

What is her expected price?

\[
\text{Expected price} = \text{Futures price} + \text{Basis} - \text{Commission} \\
= $3.78 - $0.25 - $0.01 \\
= $3.52
\]

If the Dec. 2016 corn futures rises to $4.50, what is her expected net price?

*With the hedge, her expected net price is still $3.52.*

*If futures rise to $4.50 and the basis is -$0.25, then the cash price is $4.25. But the futures return on the hedge will be negative, $3.78 - $4.50 - $0.01 = -$0.73. Her net price is the cash price + the futures return, $4.25 - $0.73 = $3.52.*
If the Dec. 2016 corn futures falls to $3.50, but the harvest time basis improves to -$0.10, what is her expected net price?

If the basis changes to -$0.10, then her expected net price also changes. But the expected price formula remains the same.

\[
\text{Expected price} = \text{Original futures price} + \text{Basis} - \text{Commission}
\]
\[
= \$3.78 - \$0.10 - \$0.01
\]
\[
= \$3.67
\]

If futures fall to $3.50 and the basis is -$0.10, then the cash price is $3.40. But the futures return on the hedge will be positive, $3.78 – $3.50 – $0.01 = $0.27. Her net price is the cash price + the futures return, $3.40 + $0.27 = $3.67.