Final Exam

Fall 2020 Econ 180-367

1 (2 points). Which of the following currencies are normally quoted with foreign currency as the base?
A. Canadian Dollar
B. Euro
C. Brazilian Real
D. Mexican Peso
E. Swiss Franc

2 (2 points). Which of the following describes a 3 month overnight indexed swap (OIS)?
A. A swap contract in which a fixed rate is exchanged for the three month Treasury bill interest rate.
B. A swap contract consisting of buying foreign exchange in the spot market and selling it three months hence in the forward market.
C. A swap contract in which a fixed rate is exchanged for the average federal funds rate over the three months of the contract.
D. A swap contract in which a fixed rate is exchanged for the return on the S&P500 index over three months.
E. A swap contract in which a fixed rate is exchanged for the yield on inflation indexed securities.

3 (2 points). Which of the following situations was observed in the crude oil market in fall 2008 (as discussed in class)?
A. The spot oil price was above the futures prices and oil traders stored as much oil as they could
B. The spot oil price was below the futures prices and oil traders stored as much oil as they could
C. The spot oil price was above the futures prices and oil traders stored as little oil as possible.
D. Spot and future oil prices were both around zero
E. The spot oil price was below the futures prices and oil traders stored as little oil as possible.

4 (2 points). Which of the following statements is true?
A. If the price of a stock increases, the price of a call option written on that stock increases and the price of a put option increases.
B. If the price of a stock increases, the price of a call option written on that stock does not change and the price of a put option does not change either.
C. If the price of a stock increases, the price of a call option written on that stock decreases and the price of a put option decreases.
D. If the price of a stock increases, the price of a call option written on that stock decreases and the price of a put option increases.
E. If the price of a stock increases, the price of a call option written on that stock increases and the price of a put option decreases

5 (2 points). Which of the following is the sensitivity of the price of a call option to the underlying stock price
A. The vega of the option
B. The delta of the option
C. The gamma of the option
D. The implied volatility of the option
E. The theta of the option

6 (2 points). Suppose you go long a Eurodollar futures contract at a price of 99.4. On the maturity date of the contract, the three month LIBOR interest rate is 30 basis points and the federal funds rate is 20 basis points. Which of the following is true?
A. You receive $75
B. You receive $1000
C. You owe $1000
D. You receive $750.
E. You owe $750

7 (2 points). The spot Chilean peso exchange rate is $1=700 pesos. One year interest rates are 10 basis points in the US and 2 percentage points in Chile. According to covered interest parity, what is the one year forward Chilean peso exchange rate?
A. $1=700 Chilean Pesos
B. $1=686.96 Chilean Pesos
C. $1=693.14 Chilean Pesos
D. $1=706.93 Chilean Pesos
E. $1=713.29 Chilean Pesos

8 (2 points). Which of the following is generally understood as the carry trade?
A. Selling a currency in the spot market and buying it in the forward market.
B. Buying a currency in the spot market and selling it in the forward market.
C. Borrowing in a low interest currency and investing in a high interest currency.
D. Shorting an exchange traded fund and going long the underlying stocks
E. Borrowing in a high interest currency and investing in a low interest currency.

9 (2 points). Coval and Shumway found that traders take on more risk in the afternoon if they have made losses in the morning than if they have made profits in the morning. What phenomenon do they attribute this to?
A. The Ellsberg Paradox
B. Ambiguity Aversion
C. Loss Aversion
D. Risk Aversion
E. Overconfidence

10 (2 points). A stock price is $40. A one-year European call option with a strike of $50 costs $3. The riskfree interest rate is zero percent. According to put-call parity, what should the price of a one-year European put option with a strike of $50 be?
A. $1
B. $7
C. $9
D. $3
E. $13

11 (2 points). Suppose that you buy both a call option and a put option on the same stock at the same price. What is the name given to this strategy?
A. A horizontal spread
B. A straddle
C. A risk reversal
D. A vertical spread
E. A strangle

12 (2 points). Which of the following best describes the terms of going long a one-year oil futures contract?
A. A contract where you pay today for oil that you will receive in one year.
B. A contract where you receive oil today and pay for it in one year at whatever the spot price turns out to be in one year's time
C. A contract where you receive oil today and pay for it in one year at the price that you agree today.
D. A contract where you will receive oil in one year and pay in one year, but pay the price that you agreed today
E. A contract where you will receive oil in one year and pay for it in one year at whatever the spot price turns out to be in one year's time

13 (2 points). Which of the following statements is the standard Wall Street view of Treasury yield curve inversion?
A. The Treasury yield curve usually inverts before a recession begins
B. The Treasury yield curve usually inverts before the economy begins to grow rapidly
C. The Treasury yield curve usually inverts before stock prices increase sharply
D. The Treasury yield curve usually inverts before inflation accelerates
E. The Treasury yield curve usually inverts before the Fed begins to tighten monetary policy

14 (2 points). The open interest on silver futures at a particular time is the:
A. number of silver futures contracts traded during the day
B. number of silver futures contracts traded the previous day
C. number of all long or short silver futures contracts outstanding
D. number of contracts traded by open ended mutual funds
E. number of outstanding silver futures contracts for delivery within the next month

15 (2 points). Suppose that you find that stock returns are on average higher in January than in other months. Which form of the efficient markets hypothesis (EMH) does this contradict?
A. It contradicts all form of the EMH except the strong form
B. It contradicts the semi-strong form of the EMH.
C. It contradicts the weak form of the EMH
D. It does not contradict the EMH
E. It contradicts all forms of the EMH

16 (2 points). A stock trades for $20. Riskfree rates are zero. Which of the following is a possible price for a put option with a strike price of $30?
A. $4
B. Any of these is possible
C. $35
D. $15
E. $6

17 (2 points). The 9 year yield is 70 basis points and the 10 year yield is 80 basis points. According to the expectations hypothesis, what is the expected one-year interest rate in nine years' time?
A. 1.7 percent
B. 1.3 percent
C. 0.6 percent
D. 1 percent
E. 0.9 percent

18 (2 points). What is the name given to an option that can be exercised on March 30, June 30 or September 30, but only on those dates?
A. A European option
B. A Bermudan option
C. An American option
D. A compound option
E. An Asian option

19 (2 points). Suppose that there are 36 stocks, each of which has returns with standard deviation 30 percent. The stocks are all mutually uncorrelated. You form an equal weighted portfolio of these stocks. What is the standard deviation of this portfolio?
A. 1.2 percent
B. 4 percent
C. 5 percent
D. 12 percent
E. 16 percent

20 (2 points). A 180 day Treasury bill trades for $9,800. The face value is $10,000. What is the interest rate computed on a bank discount basis?
A. 4.08 percent
B. 2.04 percent
C. 40 basis points
D. 4 percent
E. 2 percent

21 (5 points). XYZ stock pays no dividends and trades for $30. It's volatility is 40 percent. The riskfree rate is 2 percent. According to the Black Scholes formula, what is the price of a European call option with a maturity of 1 year and a strike price of $40?

22 (5 points). The JHU managed portfolio has an average return of 5 percent with a standard deviation of 10 percent. The market return is 6 percent with a standard deviation of 16 percent. The risk free rate is 1 percent. What is the M-squared of the JHU managed portfolio?

23 (5 points). In 2012 you entered into a ten year swap contract to pay fixed at 3 percent and receive one-year LIBOR on a notional underlying of $10 million. Now, in 2020, you want to terminate the contract. The two year fixed swap rate in 2020 is 50 basis points. The dealer is willing to terminate the swap for fair value as discussed in class. What termination fee must you pay the dealer?

24 (5 points). The price of XYZ corp is currently $60. There are four possible paths for its price over the next two years:
(i) It could go up to $80 in one year and up again to $100 in two years.
(ii) It could go up to $80 in one year and back down to $60 in two years.
(iii) It could go down to $50 in one year and back up to $60 in two years.
(iv) It could go down to $50 in one year and down again to $40 in two years.
The riskfree rate is 5 percent per year. What is the price of a European call option on the stock of XYZ corp at a strike price of $70 maturing in two years' time?

25 (5 points). You have a liability of $1 million due in 10 years. You want to immunize this liability with a portfolio of 30 year strips and 1 year bills. The interest rate on both the 30 year STRIPS and the 1 year bill is 2 percent per annum (annual rate with semiannual compounding). How much do you invest in 30 year STRIPS? How much do you invest in 1 year bills?

26 (5 points). A 10 year bond trades at par. It's coupon rate is 1 percent. What is the duration of this bond?

27 (10 points). Jane has $100 to invest. Her utility function is $E(r) - \frac{1}{2} A\sigma^2$ where $E(r)$ is expected returns , σ^2 is the variance of returns and A=4.
Jane can divide her wealth among (1) a risk-free rate returning 1 percent, (2) Johnson and Johnson stock with an expected return of 6 percent and a standard deviation of 25 percent and (3) Pfizer stock with an expected return of 9 percent and a standard deviation of 35 percent. The correlation between the returns on Johnson and Johnson stock and Pfizer stock is 0.6.
(a) How much will Jane invest in the risk-free asset?
(b) How much will Jane invest in Johnson and Johnson stock?
(c) How much will Jane invest in Pfizer stock?

28 (5 points). Suppose that Fred entered into a plain vanilla interest rate swap to pay a 50 basis point fixed rate and receive 3 month LIBOR with payments to be exchanged every 3 months. The notional underlying is $10 million. Today is a payment date, and the 3 month LIBOR interest rate is 2 percentage points. Does Fred make or receive a payment? How much?

29 (5 points). The spot price of gold is $1900 per ounce and the risk free rate is 1 percent. What is the futures price of gold for delivery in two years, assuming that storage costs are negligible?

30 (5 points). You have European call options on a barrel of oil at strikes of $35, $36 and $37. The call option at a strike of $35 costs $6.30. The call option at a strike of $36 costs $5.70. The call option at a strike of $37 costs $5.40. Suppose that oil options traders are risk neutral and know that the price of oil must be some integer. What is the probability that oil will be exactly $36 at the expiration of the option?

31 (5 points). Suppose that X and Y are well diversified portfolios. The expected return on X is 6 percent; the expected return on Y is 9 percent. The factor beta of X is 1 and the factor beta of Y is 2. The riskfree rate is 1 percent. Find an arbitrage opportunity. Be very specific about which assets you will go long and short, and in what amounts.

Solutions and Grading Rubric

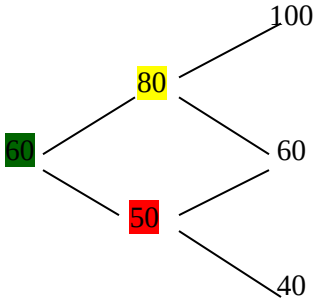
1. B.
2. C.
3. B.
4. E.
5. B.
6. D.
7. E.
8. C.
9. C.
10. E.
11. B.
12. D.
13. A.
14. C.
15. B.
16. D.
17. A.
18. B.
19. C.
20. D.

21. $d_1 = -0.4692$ and $d_1 = -0.8692$. The call option is worth $2.04.

22. Go long 1.6 shares of the JHU portfolio and borrow 0.6 at the riskfree rate. This gives the same standard deviation as market and an expected return of 7.4 percent. The M^2 is 7.4 – 6 = 1.4. 2 points for saying that it is 7.4 (without subtracting off the expected market return). 1 point off for a purely algebraic error.

23. The payment is $250,000 per year and the present value is $\frac{250,000}{1.005} + \frac{250,000}{1.005^2} = 496,275$. 1 point off for a purely algebraic error.

24. Let's draw the diagram with the nodes



At the node color-coded in red, the call option is worth nothing. There is no partial credit just for noting this correctly.

At the node color-coded in yellow, the call option will have a payoff of $0 or $30. Buying one share and borrowing $\$\frac{60}{1.05}$ will cost $22.86 and also have a payoff of $0 or $40. So the European call option is worth $17.14. 2 points for getting this far.

At the node color-coded in green, the option will pay off $17.14 or 0. If I buy 1 share and borrow $\$\frac{50}{1.05}$, this costs me $12.38 and will have a payoff of $30 or $0. So the European call option is worth $7.07.

25. Let the weight on STRIPS be x. Then 10=30x+1-x and solving this x=9/29. The present value of the liability is $819,545. So the answer is $254,341 in STRIPS and $565,203 in bills. 2 points for writing down the weights without the present value.

26. The duration is 9.54 with semiannual compounding or 9.57 with annual compounding. Because I didn't tell you which to use, either answer is acceptable.

27. Between JNJ and Pfizer, the share that she will allocate to JNJ is

$$\frac{0.05*0.1225-0.08*0.0525}{0.05*0.1225+0.08*0.0625-0.13*0.0525}=0.447674$$

Thus the risky portfolio has a mean return of 0.07657 and a variance of 0.075859. The fraction allocated to the risky portfolio should be

$$\frac{0.07657-0.01}{4*0.075859}=0.21939$$

So, of the $100, $78.06 goes to the risk-free asset and $9.82 goes to JNJ and $12.12 goes to Pfizer.

28. Fred receives $37,500. 1 point off for a purely algebraic error.

29. It is $1900*1.01^2$ =1,938.19.

30. If you go long the $35 option and short the $36 option this costs 60 cents and gives you a payoff of $1 if oil is $36 or higher and zero otherwise. So the probability of oil being $36 or higher is 60 percent. If you go long the $36 option and short the $37 option this costs 30 cents and gives you a payoff of $1 if oil is $37 or higher and zero otherwise. So the probability of oil being $37 or higher is 30 percent. Therefore the probability of oil being exactly $36 is 30 percent.

31. Go long $100 in X and short $50 in Y and borrow $50 at the riskfree rate. Absolutely no credit for doing it backwards.