

NAME \_\_\_\_\_

ID \_\_\_\_\_

FIN 325 Mid-Term Exam

VERSION A

Instructions:

Your exam should contain 20 multiple choice questions (at 2.5 points a piece) and 5 short-answer problems worth 5 points each and 2 essay-questions worth a total of 25 points. There are a total of 100 points on the exam. Note the following:

- ALL exams must be turned in by 8:45. Late exams will not be accepted.
- The letter corresponding to your multiple-choice answer must be clearly written on the answer sheet in capital letters (A, B, C, etc...).
- The TA cannot answer any questions related to the exam. If you are having difficulty interpreting a problem or if you believe there is a typographical error on the exam, note this on your exam and/or write what you ASSUME the question is asking, and answer based upon that assumption.
- Everything that you write on the essay questions will be graded. Therefore, only place material relevant to your final solution on the exam and clearly indicate your answer. If I have to guess at which number is your answer, you will receive few if any points.
- Because there are multiple versions of the exam, questions are not necessarily sequenced from easiest to hardest. Manage your time carefully and at least attempt every question.
- You may receive partial credit for your work on the essay questions, but not for the multiple choice questions.
- Some useful formulae are provided on the second page. You may or may not require other formulae to successfully answer all questions.
- Note that my TA is under strict orders to pick up your exam if you are caught either looking at your neighbor's exam or using any "cheat-sheet" or cheating in any way. You should therefore carefully avoid even the semblance of cheating (look up, not to your side). As discussed during the first day of class, I pursue ALL incidences of cheating and, in addition to receiving an "F" in the course, I will recommend that you be dismissed from the university if you are caught cheating.

Finally, remember that your goal on this exam is to maximize your score, NOT to necessarily get everything right. DON'T GET STUCK ON A SINGLE PROBLEM!

GOOD LUCK!

$$FV = PV(1+r)^t$$

$$PV = PMT \left( \frac{1}{r} - \frac{1}{r(1+r)^t} \right)$$

$$FV = PVe^{rt}$$

$$PV = \frac{PMT}{r}$$

$$PV = \frac{PMT}{r-g}$$

Multiple Choice Questions: Please write the letter that corresponds with your response on the appropriate space on the answer key. I will not grade any letters that you circle and if you circle one letter and write a different letter on the answer sheet, I will only grade the letter written on the answer sheet. So please be careful! Each question is worth 2.5 points.

**Question #1:** The primary goal of financial managers is to

- a) maximize short-term profits
- b) maximize shareholder wealth**
- c) maximize worker compensation
- d) minimize costs
- e) avoid bankruptcy

**Question #2:** Your credit card has a stated rate of 25% APR. However, the interest rate is compounded continuously. What is the actual yearly interest rate you are paying?

- a) 30.3%
- b) 28.9%
- c) 28.4%**
- d) 27.8%
- e) 25.0%

**Question #3:** What is the present value of a single \$5000 cash flow that is to be received 5 years from today? Interest rates are 5% APR.

- a) \$6,215.23
- b) \$3,896.03
- c) \$6,381.41
- d) \$3,917.63**
- e) insufficient information

**Question #4:** When interest rates increase, bond prices typically

- a) increase
- b) decrease**
- c) stay the same only if the coupon rate of the bond equals the new market rate.
- d) stay the same. Bond prices are not linked to interest rates.

**Question #5:** Elizabeth has \$55,000 in an investment account. Her goal is to have the account grow to \$100,000 in 10 years without having to make any additional contributions to the account. What effective annual rate of interest would she need to earn on the account in order to meet her goal?

- a. 9.03%
- b. 11.07%
- c. 10.23%
- d. 5.65%
- e. **6.16%**

**Question #6:** You are considering buying a new car. The sticker price is \$15,000 and you have \$4,000 to put toward a down payment. If you can negotiate a nominal annual interest rate or APR of 6 percent, compounded monthly, and you wish to pay for the car over a 5-year period, what are your monthly car payments?

- a. \$2,233.11
- b. **\$ 212.66**
- c. \$ 276.21
- d. \$ 285.78
- e. \$ 318.71

**Question #7:** You plan to purchase 100 shares of IBM stock through your Charles Schwab account. This kind of transaction is a

- a. primary market transaction.
- b. **secondary market transaction.**
- c. tertiary market transaction.
- d. direct purchase transaction from IBM.
- e. balance account transaction from Charles Schwab.

**Question #8:** You paid \$300 for a piece of art 5 years ago. Its current value is \$1,113.88. What is your annual return on this investment?

- a. 300%
- b. 271.29%
- c. 54.25%
- d. **30.00%**
- e. 74.26%

**Question #9:** What is the price today of a stock that will pay a \$1 dividend at the end of this year, and dividends are expected to grow at a constant rate of 3%/year thereafter. The required rate of return on this stock is 13%.

- a. **\$10**
- b. \$33.33
- c. \$7.69
- d. \$1
- e. cannot be determined

**Question #10:** Boards of directors are elected

- a. **either annually or on a rolling three-year basis (staggered or classified board).**
- b. every five years unless the firm is bankrupt, then every other year.
- c. only when a member resigns or dies; board appointments are life-time appointments.
- d. boards are not elected, they are appointed by the CEO and CFO.
- e. boards are not elected, they are appointed by the Securities and Exchange Commission.

**Question #11:** You invest \$1000 today in an account paying 12% APR, compounded annually. How much will you have in the account in 10 years?

- a. **\$ 3,105.85**
- b. \$ 3,300.39
- c. \$ 69,700.52
- d. \$ 10,000
- e. \$ 321.97

**Question #12:** Assuming that there are positive interest rates, fill in the blank.  
The cash flow of \$100 today is worth \_\_\_\_\_ than a cash flow of \$100 in one-year?

- a. **more**
- b. less
- c. same

**Question #13:** In an efficient capital market, security prices

- a. are reported within one hour on at least two different news programs.
- b. typically move in \$0.25 increments.
- c. **quickly and accurately reflect new information.**
- d. can diverge widely and predictably from their true or "intrinsic" values.

**Question #14:** What is the yield-to-maturity of a 5-year bond, with a 7% coupon rate that is trading at a price of \$928.25?

- a. 7.0%
- b. **8.84%**
- c. 7.57%
- d. \$70
- e. -25.65%

Use this information to answer questions #15 through #17

**Assume that bond Y and bond Z are both issued today at par. Each has the same maturity. The credit rating for bond Y is AA and the credit rating for bond Z is BBB.**

**Question #15:** Based upon today's information, which of the following statements about coupon rates is most accurate?

- a. the coupon rates of bonds Y & Z are the same.
- b. the coupon rate of Y is greater than Z.
- c. the coupon rate of Z is greater than Y.**
- d. the coupon rates of Y & Z are initially the same, but bond Y's coupon will soon be higher.

**Question #16:** Based upon today's information, which of the following statements related to price and yields is most accurate?

- a. The price of bond Y and bond Z is the same.
- b. The current yields of bonds Y & Z are the same.
- c. The price of bond Y is greater than the price of bond Z.
- d. The YTM of Y is less than the YTM of Z.
- e. The YTM of Y is greater than the YTM of Z.
- f. a & d are both true**
- g. c & e are both true.

**Question #17:** Immediately after bonds Y & Z are issued, interest rates fall. Think carefully about what should happen to the bond prices for these two bonds and select which of the following statements is most accurate.

- a. bonds Y & Z will both increase by the same amount.
- b. bond Y's price will increase by more than bond Z's.**
- c. bond Z's price will increase by more than bond Y's.
- d. neither bond Y or bond Z's price will change.

**Question #18:** Microsoft shares are currently priced at \$100 per share. You purchase 100 shares on the secondary market at a cost of \$1,000 plus a \$7 commission. Of the \$1,007 that you spent, how much does Microsoft receive?

- a. \$0
- b. \$7
- c. \$1000
- d. \$1007
- e. \$7/share or \$700

**Question #19:** A premium bond has a YTM = 6%. Which of the coupon rates below is most feasible for this bond? (Please write the letter in the space above).

- a. 5%
- b. 6%
- c. 7%
- d. all are equally likely
- e. none of the above as premium bonds have no coupons.

**Question #20:** Stock prices reported in the Wall Street Journal change on a daily basis. What causes these stock prices to change? (Please write the letter in the space above).

- a. the firm sets the price on a day-to-day basis.
- b. stock prices change based on changing forces of supply and demand for that share of stock.**
- c. the company's largest shareholder determines the daily price
- d. the Federal Reserve sets all stock prices at 4:15PM each day.
- e. the prices are set by the Wall Street Journal.

**Short-Answer and Essay Questions: Please answer in the space provided. You must show your work to receive any credit!**

**Short-Answer Question #1:** (5 points) What is the price today of a stock that will pay a \$15 dividend at the end of each of the next 3 years and will then cease to pay dividends all together. (So you will receive a total of three dividends, the first of which will be received at the end of this year). The discount rate is 10%.

PV of 3 \$15 payments is \$37.30.

**Short-Answer Question #2:** What is the price of a 10-year, 8% coupon bond that has a YTM of 5%?

PV of coupons = 617.74

PV of face = 613.91

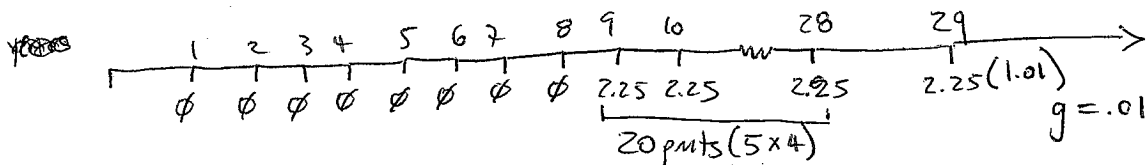
$P_B = \$1,231.65.$

**Short-Answer Question #3:** (5 points) A *call provision* gives the issuer of a bond the right to call the bond back from the bondholder at a particular price. Consider two bonds. Bond A is a 10-year bond with an 8% annual coupon that is issued by GM. Bond B is also a 10-year bond issued by GM that also has an 8% annual coupon. However, bond B also has a call provision giving GM the right to reclaim the bond prior to maturity at a price of \$1,200/bond. Which of these two bonds is selling at a higher price? Justify your answer. (Note, I am not asking you to solve for the actual prices of the two bonds, just to tell me which one is higher priced and why).

Bond A because it is not callable.

**Short-Answer Question #4** (5 points) What is the price today of a stock that will pay no dividends for the next 2 years, will then pay a quarterly dividend of \$2.25 for the next 5 years, and will then pay a dividend that will grow by 1% each quarter forever. So there will be two years worth of \$0 coupon payments, followed by 5 years worth of \$2.25 coupon payments, followed by an infinite number of additional coupon payments, each one 1% greater than the previous one. Interest rates are 12%, compounded quarterly.

Just treat everything as quarterly. So



$$V = \sum_{t=0}^{\infty} \frac{CF_t}{(1+r)^t}$$

$$V = \frac{2.25 \left[ \frac{1}{.03} - \frac{1}{.03(1.03)^{20}} \right]}{(1.03)^8} + \frac{\left[ \frac{2.25(1.01)}{.03 - .01} \right]}{(1.03)^{28}} =$$

$$= \frac{33.47}{1.03^8} + \frac{113.625}{1.03^{28}}$$

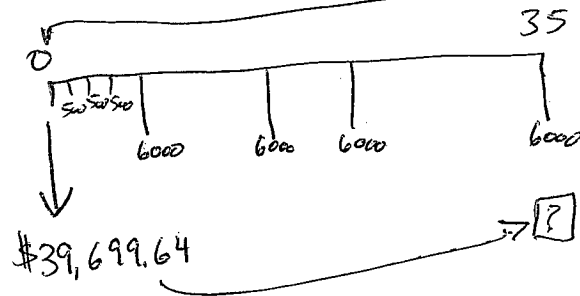
$$= \$26.42 + \$49.66 = \boxed{\$76.08}$$

Note that the first payment of the annuity is  $t=9$  and of the perpetuity at  $t=29$ . Thus, by the "Burger King" hat, the values are at  $t=8$  and  $t=28$ .

**Short-Answer Question #5** (5 points) You invest \$500 each month for 35 years. Interest rates are 15% APR, compounded annually. You may assume that compounding occurs at the end of the period. How much will you have accumulated in your account at the end of the 35-year period?

Key thing to note here is that pmts are monthly, but interest compounds annually. Thus, As I put \$500/month into the account (starting in, say, January), no compounding will occur until December. This creates an interesting kind of annuity that is an Annual Annuity where payments equal  $12 \times \$500 = \$6000/\text{year}$ .

$$PV_{\text{Annuity}} = 6000 \left[ \frac{1}{.15} - \frac{1}{.15(1.15)^{35}} \right] = \$39,699.64$$



FV of \$39,699.64

$$39,699.64 (1.15)^{35} = \boxed{\underline{\underline{\$5,287,020.94}}}$$

**Essay Question #1:** Ah, sibling rivalry... you and your beloved twin sibling are once again in a contest. Since your sibling is your twin, you are both, of course, the same age. You have been diligently saving \$100/month for the last 20 years, while your sibling has been spending (squandering) his/her income, and has managed to save nothing. You have repeatedly taunted your sibling that he/she is not going to have a very large retirement fund when you both retire in 20 years. Your sibling has declared that there is still 20 years in which to save, which is plenty of time to catch up. The retirement account that you both invest in pays 15% APR, compounded monthly.

- (a) (5 points) If you STOP investing today (so you will make no more contributions to your retirement account), how much must your sibling invest every month for the next 20 years in order to retire with the same amount as you will have in 20 years?

If I stop, I will have how much?

$$\text{Value today is } \$100 \left( \frac{1}{.0125} - \frac{1}{.0125(1.0125)^{240}} \right) = \$7,594.23$$

Value after 20 years (when I stop saving)

$$FV = \$7594.23 (1.0125)^{240} = \$149,723.95$$

So my sibling needs to save a monthly amount that equals \$149,723.95 in PV terms.

$$\text{Thus } 149,723.95 = PMT \left( \frac{1}{.0125} - \frac{1}{.0125(1.0125)^{240}} \right)$$

$$\boxed{PMT = \underline{\underline{\$1971.55}}}$$

- (b) (5 points) If you continue to put \$100 per month into your account, how much must your sibling invest every month in order to retire with the same amount of money saved as you will have saved?

Quick answer is that if my sibling must pay \$1971.55 in order to "catch-up", but I also keep saving \$100/month more, then my sibling must pay an additional \$100/month to "keep-up". So, answer is

$$\$1971.55 + 100 = \boxed{\underline{\underline{\$2071.55}}}$$

**Essay Question #2:** It is currently January 1, 2007. You have just purchased your dream home for a price of \$450,000 and financed it over 30 years. Interest rates are 12% APR, compounded monthly and you borrowed the entire amount of the purchase (\$450K). You make payments on this home on the last day of each month. (Please note, you may ignore any accumulation of interest that occurs between the end of the month and the beginning of the month.)

(A) (5 points) What are your monthly payments?

$$450,000 = PMT \left( \frac{1}{.01} - \frac{1}{.01(1.01)^{360}} \right) = \boxed{\underline{\underline{\$4,628.76}}}$$

(B) (5 points) How much interest are you paying in the first month of your mortgage?

$$450,000 * .01 = \boxed{\underline{\underline{\$4500}}}$$

(C) (5 points) How much principal do you still owe on your loan on January 1, 2025? (That is, immediately after you make your Dec 31<sup>st</sup>, 2024 payment).

So this is 18 years into the mortgage. I therefore owe the PV of the remaining 12 years.

$$PV = 4628.76 \left( \frac{1}{.01} - \frac{1}{.01(1.01)^{144}} \right) = \boxed{\underline{\underline{\$352,420.38}}}$$