

Name: _____ (2pts)

SID: _____ (2pts)

- A. Any communication with other students during the exam (including showing, viewing or sharing any writing) is strictly prohibited. Any violation will result in a score of 0 points for the exam.
- B. Answer each of the following questions in the space provided. If you need more space to show major computations you performed to obtain your answer for a particular problem, use the back of the preceding page.
- C. For problems show both the analytical formula for the answer and compute the numerical value of the answer, unless told otherwise. No credit will be given to numerical answers without the proper setup.
- D. This exam is closed book; however you may use your 1 page “cheat sheet” as described in class and on bcourses.
- E. You may use any calculator without communication ability.
- F. Present your work in an organized and neat fashion.
- G. Good luck!

Multiple Choice – circle the correct answer(s) – more than one may be correct.

(5pts each)

- 1) What does the phrase limited liability mean in a corporate context?
 - a) **Owners' liability is limited to the amount they invested in the firm.**
 - b) **Stockholders are not responsible for any encumbrances of the firm; in particular, they cannot be required to pay back any debts incurred by the firm.**
 - c) Owners' liability is limited to fifty percent of the amount they invested in the firm.
 - d) Stockholders are not responsible for any encumbrances of the firm beyond fifty percent of the amount they invested in the firm; in particular, they cannot be required to pay back any debts incurred by the firm.
- 2) Suppose the yield on German government bonds is 1.4%, while the yield on Spanish government bonds is 6.6%. Both bonds are denominated in euros. Which country do investors believe is more likely to default?
 - a) Germany
 - b) **Spain**
- 3) What is the difference between an S corporation and a C corporation?
 - a) S corporations must pay corporate income taxes; C corporations do not pay corporate taxes but must pass through the income to shareholders to whom it is taxable.
 - b) C corporations are limited to 100 shareholders and cannot have corporate or foreign stockholders.
 - c) **C corporations must pay corporate income taxes; S corporations do not pay corporate taxes but must pass through the income to shareholders to whom it is taxable.**
 - d) S corporations are limited to 100 shareholders and cannot have corporate or foreign stockholders.

- 4) Explain how the bid-ask spread is determined today.
- a) **The bid-ask spread of a stock is determined by the outstanding limit orders.**
 - b) The limit sell order with the highest price is the bid price.
 - c) **The limit sell order with the lowest price is the ask price.**
 - d) The limit buy order with the lowest price is the ask price.
 - e) **The limit buy order with the highest price is the bid price.**
- 5) A 2% increase in fees in your 401k reduces your retirement savings by approximately
- a) 1%
 - b) 4%
 - c) **30%**
 - d) 98%
- 6) Suppose Bank A offers a risk-free interest rate of 3% on both savings and loans and Bank B offers a risk-free interest rate of 4% on both savings and loans. What arbitrage opportunity is available?
- a) Take a loan from Bank A and save the money in Bank A.
 - b) Take a loan from Bank B and save the money in Bank A.
 - c) **Take a loan from Bank A and save the money in Bank B.**
 - d) Save at both banks.

Problems – show all work

- 7) (12pts) Consider two risk free bonds that pay cash flows over the next two years and that have the current market prices shown here.

Security	Price Today	Cash Flow in One Year	Cash Flow in Two Years
B1	\$ 100	\$ 115	0
B2	\$ 90	0	\$ 125

- a) What is the YTM of each of these bonds?

$$\text{YTM } b1 = 115/100 - 1 = 15\%$$

$$\text{YTM } b2 = (125/90)^{.5} - 1 = 17.85\%$$

- b) What is the no-arbitrage price of a security that pays cash flows of \$200 in one year and 300 in 2 years?

$$P = 200/115 * 100 + 300/125 * 90 = \$389.9$$

8) (12pts) The British government has a consol bond outstanding paying £500 per year forever. Assume the current interest rate is 10% per year.

a) What is the value of the bond immediately after a payment is made?

$$PV = 500/.10 = 5000$$

b) What is the value of the bond immediately before a payment is made?

$$PV = 500 + 500/.10 = 5500$$

- 9) (12pts) You are shopping for a car and read the following advertisement in the newspaper: "Own a new Spitfire! No money down. Four annual payments of just \$10,000." (Assume that you must make the annual payments at the end of each year.) You have shopped around and know that you can buy a Spitfire for cash for \$30,000. What is the interest rate the dealer is advertising (what is the IRR of the loan in the advertisement)?
- a) Write down the equation that you would need to solve for this.

$$0 = -30000 + 10000/(1+IRR) + 10000/(1+IRR)^2 + 10000/(1+IRR)^3 + 10000/(1+IRR)^4$$

- b) Is this rate 6.2%.

No, plug in .062 into the equation to get 4493 not 0

- 10)(12pts) You have decided to refinance your mortgage. You plan to borrow whatever is outstanding on your current mortgage. The current monthly payment is \$6,000 and you have made every payment on time. The original term of the mortgage was 30 years, and the mortgage is exactly four years old. You have just made your monthly payment. The mortgage interest rate is 6% (APR).
- a) How much do you owe on the mortgage today?

$$C=6000$$

$$r=6\%/12$$

$$n=(30-4)*12=312$$

$$PV=C/r*(1-1/(1+r)^n)=946,854.64$$

- b) If the new loan is for 30 years with monthly payments and has an interest rate of 5% (APR), What would your new monthly payments be?

$$PV=946,854.64$$

$$r=5\%/12$$

$$n=30*12=360$$

$$C=PV*r/(1-1/(1+r)^n)=5082.92$$

11)(18pts) Suppose the term structure of risk-free interest rates is as follows:

Term in years	1	2	3	5
Rate in %	1	1.2	1.3	1.5

- a) Suppose a risk free investment cost \$100 today and pays \$80 in both 3 and 5 years from today. Should you invest in it?

$$\text{NPV} = -100 + 80/1.013^3 + 80/1.015^5 = 51.22 > 0, \text{ so yes}$$

- b) What is the 3-year forward rate?

$$f_3 = 1.013^3 / 1.012^2 - 1 = 1.5\%$$

- c) If the 4-year forward rate is 3% what is the 5-year forward rate?

$$(1.013)^3 * (1.03)(1+f_5) = (1.015)^5$$

$$\rightarrow f_5 = (1.015)^5 / ((1.013)^3 * (1.03)) - 1 = 0.62\%$$