Chapter 4
Practice Problems

1. You plan to buy a security that will pay a $1,000 in 10 years. If the correct discount rate is 10%, then how much is the security worth today?
2. How long will it take to *quadruple* your money in a bank account that earns 5% interest?
3. What is the effective annual rate of a nominal rate of 12% with:
   - Yearly compounding?
   - Semiannual compounding?
   - Quarterly compounding?
   - Monthly compounding?
   - Daily compounding?
4. You estimate that you will earn 15% interest per year for the next 30 years on an investment that costs $5,000 today. What will be the value of the investment in
   - 10 years?
   - 20 Years?
   - 30 Years?
5. In planning for your retirement, you decide that you need to have $3 million at the beginning of your retirement, which is 30 years from today. Starting one year from today, you plan to make equal annual payments into a retirement account that will earn 14% interest. How much should you contribute each year in order to reach your target? What if you wait 11 years to start making contributions?
6. You need a new car, and you determine that you can either purchase a car for $20,000, or you can finance the car for 36 monthly payments of $1,000. If your opportunity cost is a 12% APR with monthly compounding, then which option is cheaper?
7. What is the present value of a 10-year annuity that makes $500 payments, but doesn't start making payments until 5 years from today? Assume a 10% discount rate.
8. What is the price of AT&T's preferred stock if it promises to pay a $5 annual dividend in perpetuity, assuming a required rate of return of 9%?
9. You are saving for your child's college education. Tuition will be $30,000 each year for four years, with the first tuition payment due 18 years from today.
   - How much do you need to deposit today in a bank account that earns 6% annual interest from now through the end of your child's college education so that you will have enough money to meet all the tuition payments?
   - If you decide to make 18 equal annual payments into the bank account instead (beginning one year from today), what will the payment be?
10. What would you pay today for a security that makes 50 payments of $100, but makes these payments every other year with the first payment occurring one year from today (i.e. payments occur in years 1, 3, 5, …). Assume your required rate of return on this security is 10% annually.
11. Someone offers you a security that pays $1,000 each year for 27 years with the first payment made three years from today. How much are you willing to pay for the security if your required rate of return is 8%?
12. You are 50 and saving for retirement. You determine that you will need $50,000 a per year from the time you turn 65 until you turn 90 (that is, you retire and take your first payment at $t=65$, and your last at $t=90$). You plan on saving by putting equal amounts into your retirement account each year, starting next year ($t=51$), and continuing for the following 15 years. How

much do you need to save each of the 15 years if your retirement account is expected to earn 10% annual interest?

13. You plan to save for your retirement by investing $5,000 in a mutual fund every year for 30. How much money will be in your account at the end of 30 years if the mutual fund earns 12% interest per year?

14. How much would you pay for an annuity that makes 10 payments of $7,500, but the first payment is not made for 8 years (i.e. first payment is at $t=8$), if you require a 10% return on your investment?

15. You are saving for your child's college education. You will need tuition, which will be $30,000 each year for 4 years, with the first tuition payment due 10 years from today. You decide to make 10 equal payments into a bank account that earns 5% per year beginning one year from today. How much should you invest each year?

Chapter 4
Practice Problems (w/ answers)

1. You plan to buy a security that will pay a $1,000 in 10 years. If the correct discount rate is 10%, then how much is the security worth today? **PV = $385.54**
2. How long will it take to *quadruple* your money in a bank account that earns 5% interest? **N = 28.41**
3. What is the effective annual rate of a nominal rate of 12% with:
   - Yearly compounding? **12%**
   - Semiannual compounding? **12.36%**
   - Quarterly compounding? **12.55%**
   - Monthly compounding? **12.68%**
   - Daily compounding? **12.75%**
4. You estimate that you will earn 15% interest per year for the next 30 years on an investment that costs $5,000 today. What will be the value of the investment in
   - 10 years? **FV = $20,227.79**
   - 20 Years? **FV = $81,832.69**
   - 30 Years? **FV = $331,058.86**
5. In planning for your retirement, you decide that you need to have $3 million at the beginning of your retirement, which is 30 years from today. Starting one year from today, you plan to make equal annual payments into a retirement account that will earn 14% interest. How much should you contribute each year in order to reach your target? What if you wait 11 years to start making contributions? **(a) PMT = $8,408.38, or (b) PMT = $32,958.00**
6. You need a new car, and you determine that you can either purchase a car for $20,000, or you can finance the car for 36 monthly payments of $1,000. If your opportunity cost is a 12% APR with monthly compounding, then which option is cheaper? **PV = $30,107.51 (pay cash)**
7. What is the present value of a 10-year annuity that makes $500 payments, but doesn't start making payments until 5 years from today? Assume a 10% discount rate. **PV = $2,098.41**
8. What is the price of AT&T's preferred stock if it promises to pay a $5 annual dividend in perpetuity, assuming a required rate of return of 9%? **P = $55.56**
9. You are saving for your child's college education. Tuition will be $30,000 each year for four years, with the first tuition payment due 18 years from today.
   - How much do you need to deposit today in a bank account that earns 6% annual interest from now through the end of your child's college education so that you will have enough money to meet all the tuition payments? **PV = $38,604.51**
   - If you decide to make 18 equal annual payments into the bank account instead (beginning one year from today), what will the payment be? **PMT = $3,565.38**
10. What would you pay today for a security that makes 50 payments of $100, but makes these payments every other year with the first payment occurring one year from today (i.e. payments occur in years 1, 3, 5, …). Assume your required rate of return on this security is 10% annually. **PV = $523.77**
11. Someone offers you a security that pays $1,000 each year for 27 years with the first payment made three years from today. How much are you willing to pay for the security if your required rate of return is 8%? **PV = $9,375.14**
12. You are 50 and saving for retirement. You determine that you will need $50,000 a per year from the time you turn 65 until you turn 90 (that is, you retire and take your first payment at *t*=65, and your last at *t*=90). You plan on saving by putting equal amounts into your retirement

account each year, starting next year (t=51), and continuing for the following 15 years. How much do you need to save each of the 15 years if your retirement account is expected to earn 10% annual interest? **PMT = $15,858.13**

13. You plan to save for your retirement by investing $5,000 in a mutual fund every year for 30. How much money will be in your account at the end of 30 years if the mutual fund earns 12% interest per year? **FV = $1,206,663.42**

14. How much would you pay for an annuity that makes 10 payments of $7,500, but the first payment is not made for 8 years (i.e. first payment is at t=8), if you require a 10% return on your investment? **PV = $23,648.51**

15. You are saving for your child's college education. You will need tuition, which will be $30,000 each year for 4 years, with the first tuition payment due 10 years from today. You decide to make 10 equal payments into a bank account that earns 5% per year beginning one year from today. How much should you invest each year? **PMT = $8,880.46**