1. **Simple Interest Formulas**
   - $I = Prt$
   - $A = P + Prt$

2. **Compound Interest Formula**
   - $A = P\left(1 + \frac{r}{n}\right)^{nt}$

3. **Effective Rate**
   - $E = \left(1 + \frac{r}{n}\right)^{n} - 1$

4. **Annuity Formulas (Future value of payments)**
   - $A = \frac{R \cdot \left[\left(1 + \frac{r}{n}\right)^{nt} - 1\right]}{\left(\frac{r}{n}\right)}$
   - $R = \frac{A \cdot \left(\frac{r}{n}\right)}{\left[\left(1 + \frac{r}{n}\right)^{nt} - 1\right]}$

5. **Present value of future payments**
   - $P = \frac{R \cdot \left[1 - \left(1 + \frac{r}{n}\right)^{-nt}\right]}{\left(\frac{r}{n}\right)}$

6. **Mortgage Formula (Payments for present value)**
   - $R = \frac{P \cdot \left(\frac{r}{n}\right)}{\left[1 - \left(1 + \frac{r}{n}\right)^{-nt}\right]}$

Intentionally blank.

Math 112 - Test 3

November 15, 2017

Name _____

Score _____

Show all work. Supply explanations when necessary. Partial credit will be awarded for correct work.

1. (6 points) Alex needs $1500 to buy a new MacBook Pro laptop computer. The computer store lends Alex the money at 7.99% simple interest for 18 months (1.5 years).

   (a) How much interest will Alex pay?

   (b) Alex decides to pay the total amount (principal + interest) in 18 equal monthly payments. How much is each payment?

2. (5 points) To train employees to use new equipment, Williams Muffler Repair had to borrow $4500 at $9\frac{1}{2}\%$ simple interest. The company paid $1282.50 in interest. Find the term (time length) of the loan.

3. (5 points) What simple interest rate would be required to triple the value of an investment in 8 years?

4. (8 points) Sarah is looking for a loan to purchase a new television. She can get the loan through Best Buy at 9.725% compunded monthly. On the other hand, her credit union offers 9.7% compounded daily. Compute and compare the effective interest rates. Which loan should Sarah take?

5. (5 points) How much would you have to invest into a savings account earning 2.3% compounded weekly to make it worth $5000 after 5 years?

6. (8 points) A 25-year-old woman plans to retire at age 65. She decides to invest an inheritance of $55,000 into an account earning 8% interest compounded semiannually.

   (a) How much money will be in the account when she is 65 years old?

   (b) How much money is made in interest?

7. (8 points) After winning \$85,000 on a game show, Jasmine invests the money in an account earning 7.2% compounded quarterly. Use guess and check to determine about how long it will take for the account value to grow to \$150,000.

8. (8 points) In order to plan for their retirement, a married couple decides to invest in an annuity that pays 8% compounded semiannually. They will make semiannual payments of \$2000 for 10 years.

   (a) How much will the annuity be worth after 10 years?

   (b) How much total interest will be earned?

9. (6 points) Mike and Jenny purchased new dining room furniture by agreeing to make monthly payments of $39.30 for six years. Their financing arrangement called for an interest rate of 13.99% compounded monthly. How much would the furniture cost if Mike and Jenny paid all at once in cash?

10. (6 points) Susan buys a car that is listed for $34,000. She makes a 10% down payment and then borrows the remaining amount. Her loan is paid off after making monthly payments of $500 for 6 years. When the loan is paid off, how much will she have paid in interest?

11. (20 points) A house sells for \$196,500. You make a 12% down payment and mortgage the remaining amount for 15 years at 3.7% compounded monthly.

    (a) What is the initial loan amount for your mortgage?

    (b) What is the monthly payment?

    (c) When the loan is paid off in 15 years, what will be the total interest paid?

    (d) Compute the first 3 rows of the amortization schedule. Include the interest, amount paid to principal, and the outstanding balance.

Intentionally blank.

12. (15 points) **Take-Home Problem**
    At age 25, Marie is opening a retirement account that will begin to pay distributions when she is 70. Throughout the life of the account, it will earn 7.75% compounded monthly. She will make monthly payments until she is 70, after which she would like to have monthly distributions of $3000 for 15 years. How much must Marie deposit per month? After the entire 60 years of the account, how much interest will Marie have made?