

**Math 11 Annuity & Loan Formula Worksheet: Name** \_\_\_\_\_ **Last** \_\_\_\_\_ **First** \_\_\_\_\_

**Objective:** Understanding the process of what the “annuity” formulas (sections 6.3 and 6.4) do when finding present value or accumulated value of a stream of periodic payments of \$m.

**NOTE: CHECKING YOUR WORK AND SHOWING ALL WORK**

- In Question 1 the value of A you calculate using the table and the formula should be equal the value of A using the formula.
- If your values for A (question 1) calculated by formula and by the process in the table do not match, you should check all your work and make corrections! Answers that don't match mean you didn't care enough to fix your errors and learn, so will get very little credit.
- Answer and work must “connect” correctly. Answers that match because you “fudged” the process but have incorrect work or don't show all the correct work will also get no or very little credit.

**QUESTION 1:** Ali is saving \$1000 semiannually. At the end of every 6 months he deposits \$1000 into an investment that is earning an interest rate of 5.6% compounded semiannually. He does this for 3 years.

Complete the table to find the amount Ali will have at the end of 3 years.

Time t years	Amount Deposited at time t	Time until end of 3 years = (3-t)	Future Value at t = 3 of \$1000 invested now For each row, find $1000(1+r/2)^{2(3-t)}$ Then add up these values
0			
0.5	\$1000		
1	\$1000		
1.5	\$1000		
2	\$1000		
2.5	\$1000		
3	\$1000		
<b>Add up</b> all the future values in the <b>column 4</b> to find <b>A = total accumulated future value at end of 3 years</b>			

Use the formula from section 6.3 that relates A and m to find the accumulated future value A of this stream of payments at the end of 3 years. **Show your work.**

**NOTE: CHECKING YOUR WORK AND SHOWING ALL WORK**

- In Question 2 the value of P you calculate using the table and the formula should be equal the value of P using the formula.
- If your values for P (question 2) calculated by formula and by the process in the table do not match, you should check all your work and make corrections! Answers that don't match mean you didn't care enough to fix your errors and learn, so will get very little credit.
- Answer and work must "connect" correctly. Answers that match because you "fudged" the process but have incorrect work or don't show all the correct work will also get no or very little credit.

**QUESTION 2:** Rosa needs a loan to buy equipment for her small business. She is paying back the loan in semiannual payments. She pays \$1000 at the end of every 6 months to pay off the loan amount. The loan has an interest rate of 5.6% compounded semiannually. The loan has a term of 3 years.

Complete the table to find the amount of Rosa's loan

Time t years	Loan payment made at time t	Time from start of loan until loan payment was made	Present Value at time 0 of \$1000 Payment made at time t For each row (time t) you need to find: <b>Solve <math>1000 = P (1+r/2)^{2t}</math></b> to find the " P " for that row Then add up all the "row P's" to find P = loan value
0			
0.5	\$1000	0.5	
1	\$1000	1	
1.5	\$1000	1.5	
2	\$1000	2	
2.5	\$1000	2.5	
3	\$1000	3	
<b>Add up</b> all the present values in <b>column 4</b> to find <b>P = loan amount = present value at start of 3 years</b>			

Use the formula from section 6.4 that relates P and m to find the present value P of this stream of payments at the start of 3 years. **Show your work.**