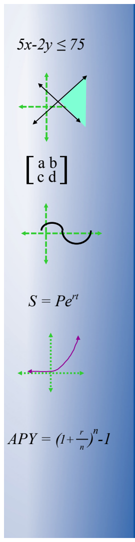

Math 1090 ~ Business Algebra

Section 5.3 Future Value of Annuities

Objectives:

- Determine the future value of an ordinary annuity.
- Solve problems involving annuities.

An <u>annuity</u> is a financial plan characterized by regular payments.

<u>Ordinary Annuity</u>	<u>Annuity Due</u>
payments made at the end of each equal payment interval	payments made at the beginning of each equal payment interval

Ex 1: Suppose you invest \$1000 at the end of each year for 5 years in an account that pays 10% interest compounded annually.

What is the value after 5 years?

end of year 1:

end of year 2:

end of year 3:

end of year 4:

end of year 5:

Generally, for an ordinary annuity, the future value is

$$S = \frac{R(1-(1+r_c)^N)}{1-(1+r_c)}$$

where $r_c = \frac{r}{n}$

R = monthly deposit

$N = nt$

Ex 2: A story of twins

a) At the end of college, Thelma invests \$2000 at the end of each year for 8 years in an account that earns 10% compounded annually. After 8 years, she contributes nothing, but it continues to earn the same interest for 36 more years. How much does she have then?

b) At the end of college Lewis invests nothing for 8 years. Then he puts \$2000 into an account at the end of each year for 36 years earning 10% interest compounded annually. How much does he have then?

Ex 3: How much should be invested quarterly (at the end of each quarter) at 12% interest compounded quarterly to pay off a debt of $30,000 in 6 years?

Sinking Fund

$$R = S\left(\frac{r_c}{(1+r_c)^N - 1}\right)$$

The payment that needs to be invested every pay period to pay off debt of S at the end.

Ex 4: Find the future value of an account with $100 deposited at the beginning of each month for 5 years into an account that pays 8% compounded monthly.

Future value of Annuity Due

$$S = R\left[\frac{(1+r_c)^{N+1} - 1}{r_c}\right] - R$$