• An **Annuity** is any collection of equal payments made over regular intervals.

  – Examples that *are Annuities*
    
    * Monthly payments on a student loan.
    * The weekly paycheck of someone who is on salary
    * The weekly paycheck of someone who works exactly the same number of hours every week

  – Examples that *Are NOT Annuities*
    
    * Weekly paycheck of someone who works different hours each week (e.g. Walmart employee who work more hours near Christmas
    * Your electric bill (assuming you’re not on a budget payment plan)

  – In the real world people use the word Annuity for a kind of insurance contract that is different than what we talk about. We will call those *insurance annuities*, but the rest of the world may call them any number of things: fixed annuity, variable annuity, tax-shelter annuity, etc.

• **Present and Future Value**

  – a sum of money to which an annuity’s payments and interest accumulate in the end is called the annuity’s **Future Value**

  – a sum of money paid at the beginning of an annuity to which the annuity’s payments are accepted as equivalent is called the annuity’s **Present Value**.
• **Example** Determine if the sum of money indicated is a Future or Present value of the annuity.

1. Delilah deposits $200 each month into a 401(k) savings plan for her retirement. She plans to keep this up for the next 45 years until she retires, (hopefully having a lot of money saved at that point). Is the value of the account when Delilah retires a present or future value?

2. Esther borrowed $150,000 to buy a house. To pay off the mortgage loan she will make monthly payments of $621.12 each month for the next 130 years. Is $150,000 a present or future value?

3. For the past 3 years, Abagail has been adding $30 a week into a special savings account for a vacation. Today the account has $4985.83 in it. Is $4985.83 a present or future value?

• **Timing of Payments**

  – an **Ordinary Annuity** is an annuity whose payments are made at the end of each time period.

  – an **Annuity Due** is an annuity whose payments are made at the beginning of each time period.

  – We assume annuities are *ordinary* unless they are otherwise specified.

  – Time periods start or end according to when the Annuity started, not according to a calendar.

• **Example**: Indicate if the following are ordinary annuities or annuities due.

1. Magdelena took out a car loan on October 6th, her first payment of $299 will be due on November 6th (and the next payment will be on December 6th and so on).

2. Caleb had to take out (relatively small amount of) student loans. He’s now making payments of $70 a month.

3. Solomon won the lottery, and he will receive his prize as yearly payments of $7,371 (for 15 years). He will receive the first payment immediately, and the next in one year’s time.
For each of the following indicate if it is an Annuity or not. For those that are Annuities, indicate if they are ordinary annuities or annuity due. If appropriate, identity a present or future value. You many need to state/explain assumptions for your answer.

1. The Lot corporation has put aside $9,000 each month for the past 6 years into a special account earmarked for ‘capital improvements.’ Today there is $698,433.41 in that account.

2. Gabriel just bought a car on May 24th, and he borrowed the entire cost of the car ($19,999) as a loan. His monthly payments will be $375 a month for the next 5 years. His first payment is due June 23rd.

3. Gabriel just opened a car insurance policy that begins today (to go with his new car). He paid $437 today, and will pay the same amount every 6 months for his insurance.

4. Naomi take her son shopping for new school clothes at the start of every August.

5. Tabitha has $18,832.95 saved. She’s decided to go back to school (so she won’t be working as much). She will use her savings to pay herself $803.70 each month for the next 24 months to supplement her living expenses.

6. Luke has been saving for retirement. He put aside $184.23 each month for the past 40 years, today the account has $480,862.17 in it.

7. Luke retired today, his retirement account has $480,862.17 in it. He plans to be retired for the next 30 years and determines that he can make regular withdrawals of $3192.70 each month for the next 30 years. He makes his first withdrawal immediately.

8. At the end of each quarter the local credit union pays dividends to its shareholders. The amount each dividend is worth depends on the credit union’s profit for the quarter.