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Name: Kevin Aziz
Class: CIS351
Assignment: Hw2.1  -- Segments 126, 401, 436, 459, 469

public class HW_2_1 {

        public static void main(String args[]){

                // Samples for Segment 126
                System.out.println("\n\nSegment 126:");
                System.out.println("Ratio for inputs 80, 55: "+segment126(80,55));
                System.out.println("Ratio for inputs 30, 55: "+segment126(30,55));
                System.out.println("Ratio for inputs 55.5, 55: "+segment126(55.5,55));
                System.out.println("Ratio for inputs 40.2, 52.1:
"+segment126(40.2,52.1));

                // Samples for Segment 401 (True: male, False: female)
                System.out.println("\n\nSegment 401:");
                segment401(61,1.72, true);
                segment401(67,1.72, true);
                segment401(69,1.72, true);
                segment401(68,1.72, false);
                segment401(66,1.72, false);

                // Samples for Segment 436  (Returning -1 means invalid input)
                System.out.println("\n\nSegment 436: ");
                System.out.println("Iterative Factorial of 5: "+segment436(5));
                System.out.println("Iterative Factorial of 4: "+segment436(4));
                System.out.println("Iterative Factorial of 1: "+segment436(1));
                System.out.println("Iterative Factorial of -24: "+segment436(-24));

                // Samples for Segment 459  (Returning -1 means invalid input)
                System.out.println("\n\nSegment 459: ");
                System.out.println("Recursive Factorial of 5: "+segment436(5));
                System.out.println("Recursive Factorial of 4: "+segment436(4));
                System.out.println("Recursive Factorial of 1: "+segment436(1));
                System.out.println("Recursive Factorial of -24: "+segment436(-24));


                // Samples for Segment 469
                System.out.println("\n\nSegment 469: ");
                System.out.println("Input: 2000, 2");
                segment469(2000,2);
                System.out.println("Input: 1900, 2");
                segment469(1900,2);
                System.out.println("Input: 1992, 2");
                segment469(1992,2);
                System.out.println("Input: 1993, 3");
                segment469(1993,3);
                System.out.println("Input: 2012, 9");
                segment469(2012,9);
                System.out.println("Input: 2099, 7");
                segment469(2012,9);
                System.out.println("Input: 2013, 2");
                segment469(2013,2);
```

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        }

        //Segment 126 - Find the ratio of energies of a car moving at two specified
velocities
        public static double segment126(double v1,double v2){
                return square(v1)/square(v2);
        }

        public static double square(double n){
            return n*n;
        }

        public static void segment401(double weight, double height, boolean gender){
            //Gender Codes: I used a boolean for gender -- True is Male, False is
female
            System.out.println("\nInput:
segment401("+weight+","+height+","+gender+");\nOutput:");

            double ideal;//, diff;
            int diff;

            if(gender){
                ideal = 56.2 + 55.5*(height-1.524);
            }
            else {
                ideal = 53.1 +53.5*(height-1.524);
            }

            diff = (int)(weight-ideal);
            if(diff==0) System.out.println("\tThis person is the correct weight");
            else if(diff>0){
                if(diff==1)System.out.println("\tThis person is 1 kilogram
overweight");
                else System.out.println("\tThis person is "+diff+" kilograms
overweight");
            }
            else{
                if(diff==-1)System.out.println("\tThis person is 1 kilogram
underweight");
                else System.out.println("\tThis person is "+(0-diff)+" kilograms
underweight");

            }

        }

        public static int segment436(int n){
            if (n<0)     return -1; //Consider -1 to be an error, invalid input

            int factorial = 1;
            //Iterate with a for loop
            for(int i=n; i>1; i--){
                factorial *= i;
            }
            return factorial;
```

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	}

	public static int segment459(int n){
		if (n<0)      return -1; //Consider -1 to be an error, invalid input
		if (n==1 || n==0)   return 1;
		return n*segment459(n-1);
	}

	public static void segment469(int year, int month){
		int days;
		switch(month){
			case 1:
				days = 31;
				break;
			case 2:
				if(year%400==0) days = 29;
				else if(year%100==0) days = 28;
				else if(year%4==0) days = 29;
				else days = 28;
				break;
			case 3:
				days = 31;
				break;
			case 4:
				days = 30;
				break;
			case 5:
				days = 31;
				break;
			case 6:
				days = 30;
				break;
			case 7: days = 31;
			break;
			case 8:
				days = 31;
				break;
			case 9:
				days = 30;
				break;
			case 10:
				days = 31;
				break;
			case 11:
				days = 30;
				break;
			case 12:
				days = 31;
				break;
			default: System.out.println("Invalid month"); return;
		}
		System.out.println("That month has "+days+" days.");
	}
}
```

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Method Outputs:

Segment 126:
Ratio for inputs 80, 55: 2.115702479338843
Ratio for inputs 30, 55: 0.2975206611570248
Ratio for inputs 55.5, 55: 1.0182644628099173
Ratio for inputs 40.2, 52.1: 0.5953558968615648

Segment 401:

Input: segment401(61.0,1.72,true);
Output:
      This person is 6 kilograms underweight

Input: segment401(67.0,1.72,true);
Output:
      This person is the correct weight

Input: segment401(69.0,1.72,true);
Output:
      This person is 1 kilogram overweight

Input: segment401(68.0,1.72,false);
Output:
      This person is 4 kilograms overweight

Input: segment401(66.0,1.72,false);
Output:
      This person is 2 kilograms overweight

Segment 436:
Iterative Factorial of 5: 120
Iterative Factorial of 4: 24
Iterative Factorial of 1: 1
Iterative Factorial of -24: -1

Segment 459:
Recursive Factorial of 5: 120
Recursive Factorial of 4: 24
Recursive Factorial of 1: 1
Recursive Factorial of -24: -1

Segment 469:
Input: 2000, 2
That month has 29 days.
Input: 1900, 2

```
That month has 28 days.
Input: 1992, 2
That month has 29 days.
Input: 1993, 3
That month has 31 days.
Input: 2012, 9
That month has 30 days.
Input: 2099, 7
That month has 30 days.
Input: 2013, 2
That month has 28 days.
```