E5.1 Write a program that reads an integer and prints whether it is negative, zero, or positive.

E5.2 Write a program that reads a floating-point number and prints "zero" if the number is zero. Otherwise, print "positive" or "negative". Add "small" if the absolute value of the number is less than 1, or "large" if it exceeds 1,000,000.

E5.3 Write a program that reads an integer and prints how many digits the number has, by checking whether the number is ≥ 10, ≥ 100, and so on. (Assume that all integers are less than ten billion.) If the number is negative, first multiply it with −1.

E5.4 Write a program that reads a string, compares the first and last letter, and prints "first and last letter same" or "first and last letter different".

E5.5 Write a program that reads a word, compares the first and second half of the word, and prints "first and second half same" or "first and second half different". If the length of the word is odd, ignore the middle letter.

E5.6 Write a program that reads three numbers and prints "all the same" if they are all the same, "all different" if they are all different, and "neither" otherwise.

E5.7 Write a program that reads three numbers and prints "increasing" if they are in increasing order, "decreasing" if they are in decreasing order, and "neither" otherwise. Here, "increasing" means "strictly increasing", with each value larger than its predecessor. The sequence 3 4 4 would not be considered increasing.

E5.8 Repeat Exercise •• E5.7, but before reading the numbers, ask the user whether increasing/decreasing should be "strict" or "lenient". In lenient mode, the sequence 3 4 4 is increasing and the sequence 4 4 4 is both increasing and decreasing.

E5.9 Write a program that reads in three integers and prints "in order" if they are sorted in ascending or descending order, or "not in order" otherwise. For example,
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1 2 5 in order
1 5 2 not in order
5 2 1 in order
1 2 2 in order
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E5.10 Write a program that reads four integers and prints "two pairs" if the input consists of two matching pairs (in some order) and "not two pairs" otherwise. For example,

1 2 2 1 two pairs

1 2 2 3 not two pairs

2 2 2 2 two pairs

E5.11 A compass needle points a given number of degrees away from North, measured clockwise. Write a program that reads the angle and prints out the nearest compass direction; one of N, NE, E, SE, S, SW, W, NW. In the case of a tie, prefer the nearest principal direction (N, E, S, or W).

E5.13 Write a program that translates a letter grade into a number grade. Letter grades are A, B, C, D, and F, possibly followed by + or −. Their numeric values are 4, 3, 2, 1, and 0. There is no F+ or F−. A + increases the numeric value by 0.3, a − decreases it by 0.3. However, an A+ has value 4.0.

Enter a letter grade: B The numeric value is 2.7.

Use a class Grade with a method getNumericGrade.

E5.14 Write a program that translates a number between 0 and 4 into the closest letter grade. For example, the number 2.8 (which might have been the average of several grades) would be converted to B–. Break ties in favor of the better grade; for example 2.85 should be a B.

Use a class Grade with a method getLetterGrade.

E5.15 The original U.S. income tax of 1913 was quite simple. The tax was
• 1 percent on the first $50,000.
• 2 percent on the amount over $50,000 up to $75,000.
• 3 percent on the amount over $75,000 up to $100,000.
• 4 percent on the amount over $100,000 up to $250,000.
• 5 percent on the amount over $250,000 up to $500,000.
• 6 percent on the amount over $500,000.

There was no separate schedule for single or married taxpayers. Write a program that computes the income tax according to this schedule.

E5.16 Write a program that takes user input describing a playing card in the following shorthand notation:

A	Ace
2….10	Card values
J	Jack
Q	Queen
K	King
D	Diamonds
H	Hearts
S	Spades
C	Clubs

Your program should print the full description of the card. For example,

Enter the card notation: QS

Queen of Spades

Implement a class Card whose constructor takes the card notation string and whose getDescription method returns a description of the card. If the notation string is not in the correct format, the getDescription method should return the string "Unknown".

E5.17 Write a program that reads in three floating-point numbers and prints the largest of the three inputs. For example:

Please enter three numbers: 4 9 2.5

The largest number is 9.

E5.18 Write a program that reads in three strings and sorts them lexicographically.

Enter three strings: Charlie Able Baker

Able Baker Charlie

E5.19 Write a program that reads in two floating-point numbers and tests whether they are the same up to two decimal places. Here are two sample runs.

Enter two floating-point numbers: 2.0 1.99998

They are the same up to two decimal places.

Enter two floating-point numbers: 2.0 1.98999

They are different.

E5.20 Write a program that prompts the user to provide a single character from the alphabet. Print Vowel or Consonant, depending on the user input. If the user input is not a letter (between a and z or A and Z), or is a string of length > 1, print an error message.

E5.21 Write a program that asks the user to enter a month (1 for January, 2 for February, etc.) and then prints the number of days in the month. For February, print "28 days".

Enter a month: 5

30 days

Use a class Month with a method

public int getLength()

Do not use a separate if/else branch for each month. Use Boolean operators.

E5.22 Write a program that reads in the name and salary of an employee. Here the salary will denote an hourly wage, such as $9.25. Then ask how many hours the employee worked in the past week. Be sure to accept fractional hours. Compute the pay. Any overtime work (over 40 hours per week) is paid at 150 percent of the regular wage. Print a paycheck for the employee. In your solution, implement a class Paycheck.

E5.23 A supermarket awards coupons depending on how much a customer spends on groceries. For example, if you spend $50, you will get a coupon worth eight percent of that amount. The following table shows the percent used to calculate the coupon awarded for different amounts spent.

Money Spent	Coupon Percentage
Less than $10	No coupon
From $10 to $60	8%
More than $60 to $150	10%
More than $150 to $210	12%
More than $210	14%

Write a program that calculates and prints the value of the coupon a person can receive based on groceries purchased.

Here is a sample run:

Please enter the cost of your groceries: 14

You win a discount coupon of $ 1.12. (8% of your purchase)

E5.24 Write a program that reads a temperature value and the letter C for Celsius or F for Fahrenheit. Print whether water is liquid, solid, or gaseous at the given temperature at sea level.

E5.25 The boiling point of water drops by about one degree centigrade for every 300 meters (or 1,000 feet) of altitude. Improve the program of Exercise • Science E5.24 to allow the user to supply the altitude in meters or feet.

E5.26 Add error handling to Exercise • Science E5.25. If the user does not enter a number when expected, or provides an invalid unit for the altitude, print an error message and end the program.