

3.15 Practice Programs

Sample solutions to these problems will be included by the beginning of 2013 at the following website:

<http://www.cs.ucf.edu/~dmarino/ucf/transparency/cop3223/book/>

1) Write a program that does temperature conversion from either Fahrenheit to Celsius, or the other way around. Your program should first prompt the user for which type of conversion they want to do. Then your program should prompt the user for the temperature they want to convert. Finally, your program should output the proper converted temperature. The formula for conversion from Celsius to Fahrenheit is:

$$F = 1.8 * C + 32$$

2) Debbie likes numbers that have the same tens digit and units digit. For example, Debbie likes 133 and 812355, but she does not like 137 or 4. Write a program that asks the user for a number and then prints out whether or not Debbie likes the number.

3) Write a program that prompts the user for 2 pieces of information: (1) age, (2) amt. of cash they have. Based upon these inputs, your program should produce one of the four outputs below for the given situations:

Situation	Output
$A < 21, M < 100$	"You have some time before you need more money."
$A < 21, M \geq 100$	"You have got it made!"
$A \geq 21, M < 100$	"You need to get a job!"
$A \geq 21, M \geq 100$	"You are right on track."

4) Scholarships are given based on students' SAT score and GPA. In particular, based on these two items, a composite score is calculated with the following formula:

$$(\text{SAT score})/1000 + \text{GPA}$$

(Note: The formula refers to real number division.) The amount of scholarship money awarded is based on this composite score as follows:

Composite Score (s)	Scholarship Amount
$4 < s < 5$	\$1000
$5 \leq s < 6$	\$2500
$s \geq 6$	\$5000

Write a program that asks the user for their SAT score and GPA and prints out the amount of scholarship money they receive.

5) Write a guessing game for two players where both players guess a number in between 1 and 100. Your program should generate the "secret number" randomly. The winner is determined as follows:

If both players guess the same number, the first player wins.

If one player's guess is closer than the other player, then that player wins.

If both players' guesses are off by the same value, then the player that guessed the lower number wins.

For example, if the secret number is 71 and the two players guesses are 64 and 77, then the player that guesses 77 wins, since $77 - 71 = 6$ and $71 - 64 = 7$. Alternatively, if the secret number is 45 and the two players guesses are 36 and 54, then the player that guesses 36 wins, since $45 - 36 = 9$, $54 - 45 = 9$, and 36 is less than 54.

6) Sales clerks at "Computers R Us" get paid a bonus for their sales. In particular, they get \$10 for each of the first 10 computers they sell in a month, \$20 for the next 10 computers they sell in a month, and \$40 for each computer thereafter. For example, if a clerk sells 15 computers, they make \$100 for the first 10 and \$100 for the next 5 for a total of \$200. Alternatively, if a clerk sells 22 computers, they make \$380 in bonuses. Write a program that asks the user how many computers they sold and prints out their bonus for the month.

7) Write a program that calculates the number of pitchers of lemonade that can be made with certain raw materials. Ask the user to enter the number of teaspoons of sugar and number of lemons necessary to make a pitcher of lemonade. Follow this by asking the user the total number of teaspoons of sugar and number of lemons that are available to make lemonade. Use this information to calculate the number of full pitchers of lemonade that can be made and also print out the leftover ingredients (number of teaspoons of sugar and lemons) after those pitchers have been made.

8) Two competing companies offer different bulk buying plans for buying boxes of cereal. The first 100 boxes are at one price point, the next 1000 are at a second price point and all subsequent boxes are at a third price point. Ask the user to enter the three price points for two companies as well as the number of boxes they desire to buy. Your program should print out which company they should go with and how much their purchase will cost. If both companies will provide the same price, you may choose either. Consider the price points of two companies shown below:

Company	Price for first 100	Price for next 1000	Price for rest
1	\$2.99	\$1.99	\$1.50
2	\$2.50	\$2.25	\$1.75

If we buy 2000 boxes of cereal from company 1, we spend $100 * \$2.99 + 1000 * \$1.99 + 900 * \$1.50 = \3639 . If we buy the same boxes from company 2, we spend $100 * \$2.50 + 1000 * \$2.25 + 900 * \$1.75 = \4075 . Thus, in this case, we should go with company 1.

9) On planet C, leap years occur on every year divisible by 7, except for years that are divisible by either 35 or 77. (Thus, the first ten leap years after 0 on planet C are: 7, 14, 21, 28, 42, 49, 56, 63, 84 and 91.) Write a program that prompts the user to enter a year (positive integer) and prints out whether or not this year is a leap year on planet C.

10) Write a program that determines whether or not Anna and Bob were at the restaurant at the same time. Ask the user when Anna and Bob arrived at and left the restaurant, respectively. (The user should answer in number of minutes after midnight, and assume that both arrived and left on the same day.) Determine whether or not Anna and Bob were at the restaurant at the same time, and if so, for how many minutes they overlapped. For example, if Anna arrived at 720 minutes after midnight and left 800 minutes after midnight and Bob arrived at 600 minutes after midnight and left 740 minutes after midnight, they were at the restaurant together for 20 minutes. (Note: If Bob leaves at the same time Anna arrives, then they were not at the restaurant at the same time.)