# If…else… Programming Exercises

## Exercise 0 — Discount Prices

During a special sale at a store, a 10% discount applies to purchases over $10.00. Write a program that asks for the amount of purchases, and then calculates the discounted price. The purchase amount will be input in dollars

Enter amount of purchases: 20

Discounted price: 18.00

## Exercise 1 — Order Checker

Bob's Discount Bolts charges the following prices:

* 5 cents per bolt
* 3 cents per nut
* 1 cent per washer

Write a program that asks the user for the number of bolts, nuts, and washers in their purchase and then calculates and prints out the total.

As an added feature, the program checks the order. A correct order must have at least as many nuts as bolts and at least twice as many washers as bolts; otherwise the order has an error. For an error the program writes out "Check the Order: too few nuts" or "Check the Order: too few washers" as appropriate. Both error messages are written if the order has both errors.

If there are no errors the program writes out "Order is OK." In all cases the total price in cents (of the specified number of items) is written out.

Number of bolts: 12

Number of nuts: 8

Number of washers: 24

Check the Order: too few nuts

Total cost: 108

## Exercise 2 — Last Chance Gas

Al's Last Chance Gas station sits on Route 190 on the edge of Death Valley. There is no other gas station for 200 miles. You are to write a program to help drivers decide if they need gas. The program asks for:

* The capacity of the gas tank, in gallons.
* The indication of the gas gauge in percent (full= 100, three quarters full = 75, and so on).
* The miles per gallon of the car.

The program then writes out "Get Gas" or "Safe to Proceed" depending on if the car can cross the 200 miles with the gas remaining in the tank.

Tank capacity: 12

Gage reading: 50

Miles per gallon: 30

Get Gas!

Top of Form

Bottom of Form

## Exercise 3 — Pie Eating Contest

At the State Fair Pie Eating Contest all contestants in the heavyweight division must weigh within 30 pounds of 250 pounds. Write a program that asks for a contestant's weight and then says if the contestant is allowed in the contest.

## Exercise 4 — Wind Chill Index

The wind chill index (WCI) is calculated from the wind speed v in miles per hour and the temperature t in Fahrenheit. Three formulas are used, depending on the wind speed:

if (0 <= v <= 4) then WCI = t

if (v >=45) then WCI = 1.6t - 55

otherwise, WCI = 91.4 + (91.4 - t)(0.0203v - 0.304(v)1/2 - 0.474)

To calculate (v)1/2 use Math.sqrt( double ).

## Exercise 5 — Matinee Movie Tickets

Write a program that determines the price of a movie ticket (similar to the one in the chapter). The program asks for the customer's age and for the time on a 24-hour clock (where noon is 1200 and 4:30PM is 1630). The normal adult ticket price is $8.00, however the adult matinee price is $5.00. Adults are those over 13 years. The normal children's ticket price is $4.00, however the children's matinee price is $2.00. A matinee is any performance that takes place before 5:00PM (1700).

Get the information from the user and then use nested if statements to determine the ticket price. It is usually a good idea to separate the "information gathering phase" (asking the user for age and time) from the "processing phase" of a program (determine the ticket price). There are many ways in which the if statements can be nested. Sketch out a flowchart as you design your program.

## Exercise 6 — Internet Delicatessen

You have been asked to write a program for the Sam and Ella Delicatessen. The program takes deli orders from the Internet. It asks for the item, its price, and if rush shipping is wanted. The program writes out the order and the charges. Regular shipping for items under $10 is $2.00; for items $10 or more shipping is $3.00. For rush delivery add $5.00.

Enter the item: Tuna Salad

Enter the price: 4.50

Rush delivery? (0==no, 1==yes): 1

Invoice:

Tuna Salad 4.50

shipping 7.00

total 11.50

## Exercise 7 — Steam Engine Efficiency

The maximum possible efficiency of a steam engine depends on the temperature of the steam in the boiler and the temperature of the outside air:

efficiency = 1 - tAir / tSteam

where tAir is the air temperature and tSteam is the steam temperature. The temperatures are give in degrees above absolute zero. Normal air temperature is about 300oK. Boiling is 373oK. Write a program that asks the user for the air temperature and the steam temperature and writes out the maximum possible efficiency of a steam engine. However, if the steam temperature is less than 373oK there is no steam, so the efficiency is zero.

## Exercise 8 — Microwave Oven

A microwave oven manufacturer recommends that when heating two items, add 50% to the heating time, and when heating three items double the heating time. Heating more than three items at once is not recommended. Write a program that asks the user for the number of items and the single-item heating time. The program then writes out the recommended heating time.

## Exercise 9 — Fantasy Game

In a new role-playing fantasy game players must design their character by picking a point value for each of three characteristics:

* Strength, from 1 to 10
* Health, from 1 to 10
* Luck, from 1 to 10

Write a program that asks for a name for the character and asks for the point value of for each of the three characteristics. However, the total points must be less than or equal to 15. If the total exceeds 15, then 5 points are assigned to each characteristic

Welcome to Java's Quest

Enter the name of your character: Chortle

Enter strength (1-10): 8

Enter health (1-10): 4

Enter luck (1-10): 6

You have given your character too many points! Default values have been assigned:

Chortle, strength: 5, health: 5, luck: 5

## Exercise 10 — Check Charge

A bank has the following rule: if a customer has more than $1000 dollars in their checking account or more than $1500 dollars in their savings account, then there is no service charge for writing checks. Otherwise there is a $0.15 charge per check. Write a program that asks for the balance in each account and then writes out the service charge.

## Exercise 11 — Tire Pressure

The front tires of a car should both have the same pressure. Also, the rear tires of a car should both have the same pressure (but not necessarily the same pressure as the front tires.) Write a program that reads in the pressure of the four tires and writes a message that says if the inflation is OK or not.

Input right front pressure

38

Input left front pressure

38

Input right rear pressure

42

Input left rear pressure

42

Inflation is OK

## Bonus Exercise — More Tire Pressure

It’s not enough that the pressures are the same in the tires, but the pressures must also be within range. Modify the program in exercise 15 so that it also checks that each tire has a pressure between 35 and 45. If a tire is out of range, write out an error message immediately, but continue inputting values and processing them:

Input right front pressure

32

Warning: pressure is out of range

Input left front pressure

32

Warning: pressure is out of range

Input right rear pressure

42

Input left rear pressure

42

Inflation is BAD

If there have been any warnings, write out a final error message. (To do this, declare a boolean variable goodPressure that is initialized to true but is changed to false when an out of range tire is first found.)

## Bonus Exercise — The Pressure is Building

Tires don't have to have exactly the same pressure. Modify the program so that the front tires can be within 3 psi of each other, and the rear tires can be within 3 psi of each other.

Input right front pressure

35

Input left front pressure

37

Input right rear pressure

41

Input left rear pressure

44

Inflation is OK