5.1 Determine the values of the following expressions yourself before checking your answers using MATLAB. You may need to consult Table 5.3.

(a) `1 & -1`
(b) `13 & ~(-6)`
(c) `0 < -2|0`
(d) `~[1 0 2] * 3`
(e) `0 <= 0.2 <= 0.4`
(f) `5 > 4 > 3`
(g) `2 > 3 & 1`

5.2 Given that `a = [1 0 2]` and `b = [0 2 2]` determine the values of the following expressions. Check your answers with MATLAB.

(a) `a ~= b`
(b) `a < b`
(c) `a < b < a`
(d) `a < b < b`
(e) `a | (~a)`
(f) `b & (~b)`
(g) `a(~(~b))`
(h) `a = b == a` (determine final value of `a`)

5.4 The Receiver of Revenue (Internal Revenue Service) decides to change the tax table used in Section 5.5 slightly by introducing an extra tax bracket and changing the tax-rate in the third bracket, as shown in the table on the next page.
Amend the logical vector script to handle this table, and test it on the following list of incomes (dollars): 5000, 10 000, 15 000, 22 000, 30 000, 38 000 and 50 000.

5.5 A certain company offers seven annual salary levels (dollars): 12 000, 15 000, 18 000, 24 000, 35 000, 50 000 and 70 000. The number of employees paid at each level are, respectively: 3000, 2500, 1500, 1000, 400, 100 and 25. Write some statements at the command line to find the following:

Taxable income	Tax payable
$10 000 or less	10% of taxable income
Between $10 000 and $20 000	$1000 + 20% of amount by which taxable income exceeds $10 000
Between $20 000 and $40 000	$3000 + 30% of amount by which taxable income exceeds $20 000
More than $40 000	$9000 + 50 per cent of amount by which taxable income exceeds $40 000

(a) The average salary *level*. Use `mean`. (Answer: 32 000)

(b) The number of employees above and below this average salary level. Use logical vectors to find which salary levels are above and below the average level. Multiply these logical vectors element by element with the employee vector, and `sum` the result.
(Answer: 525 above, 8000 below)

(c) The *average salary earned* by an individual in the company (i.e., the total annual salary bill divided by the total number of employees). (Answer: 17 038.12).

5.6 Write some statements on the command line to remove the largest element(s) from a vector. Try it out on `x = [1 2 5 0 5]`. The idea is to end up with `[1 2 0]` in `x`. Use `find` and the empty vector `[ ]`.

5.7 The electricity accounts of residents in a very small rural community are calculated as follows:

- if 500 units or less are used the cost is 2 cents per unit;
- if more than 500, but not more than 1000 units are used, the cost is $10 for the first 500 units, and then 5 cents for every unit in excess of 500;
- if more than 1000 units are used, the cost is $35 for the first 1000 units plus 10 cents for every unit in excess of 1000;
- in addition, a basic service fee of $5 is charged, no matter how much electricity is used.

The five residents use the following amounts (units) of electricity in a certain month: 200, 500, 700, 1000 and 1500. Write a program which uses logical vectors to calculate how much they must pay. Display the results in two columns: one for the electricity used in each case, and one for amount owed. (Answers: $9, $15, $25, $40, $90)

Additional Homework:

(1) Use provided program ***score.m*** to input scores of 10 students and save the scores to the data file ***score_data.***

(2) Refer to the program in Sec. 5.2 & 5.3 to write a Matlab program ***cal_score.m*** to calculate the average score and GPA for each student. And save to the variable ***stu_score*** and then save all the variables to the ***score_data_2***.