

## Exercise 5

### Control Flow. Switch Statement.

1. Launch Microsoft Visual Studio.
2. Create a new project.
3. Enter the source code that inputs a character and tests if the input character is a vowel or end of file. (CTRL-Z enters end of file.)

```
/* Test if the input character is a vowel or end of file. */
```

```
#include <stdio.h>
```

```
int main ()
```

```
{
```

```
    int ch;
```

```
    printf ("Enter character: ");
```

```
    ch = getchar();
```

```
    switch(ch)
```

```
    {
```

```
        case 'A':
```

```
        case 'E':
```

```
        case 'I':
```

```
        case 'O':
```

```
        case 'U':
```

```
        case 'a':
```

```
        case 'e':
```

```
        case 'i':
```

```
        case 'o':
```

```
        case 'u': printf ("Vowel\n");
```

```
            break;
```

```
        case EOF: printf ("End of file\n");
```

```
            break;
```

```
        default: printf ("The character is not a vowel!\n");
```

```
            break;
```

```
    /* End of switch */
```

```
    return 0;
```

```
}
```

4. Compile and run the program.
5. Create a new project.
6. Write a program that converts a number of points between 0 and 100 into a mark using a table:

Number of points	Mark
< 50	2
50 ÷ 59	3
60 ÷ 69	4
70 ÷ 79	5
≥ 80	6

```

#include <stdio.h>
int main()
{
    int points, mark = 0;
    printf ("Enter points = ");
    scanf ("%d", &points);
    switch (points / 10)
    {
        case 0: if (points >= 0) mark = 2;
                break;
        case 1:
        case 2:
        case 3:
        case 4: mark = 2;
                break;
        case 5: mark = 3;
                break;
        case 6: mark = 4;
                break;
        case 7: mark = 5;
                break;
        case 8:
        case 9: mark = 6;
                break;
        case 10: if (!(points % 10))
                 mark = 6;
                 break;
        default: printf ("Invalid points!\n");
                 break;
    }
    if (mark)
        printf ("Mark = %d\n", mark);
    else
        printf ("Points are out of range!!!");
    return 0;
}

```

7. Compile and run the program.
8. Create a new project.
9. Write a program that prints the solutions to the quadratic equation  $ax^2 + bx + c = 0$ . Read in  $a$ ,  $b$ ,  $c$  and use the quadratic formula:

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If the discriminant is negative, display the real part and the imaginary part of the complex solution.

```

#include <stdio.h>
#include <math.h>
int main()
{
    float a, b, c, re, d, im, x1, x2;
    printf ("Enter a, b, c = ");
    scanf ("%f%f%f", &a, &b, &c);
    if ((a == 0) && (b == 0))
        printf ("It is not an equation\n");
    else if (a == 0)
    {
        x1 = -c / b;
        printf ("Linear equation x = %.3f\n", x1);
    }
    else if (c == 0)
    {
        x1 = -b / a;
        x2 = 0;
        printf ("Too real roots x1 = %.3f, x2 = %.3f\n", x1, x2);
    }
    else
    {
        re = -b / (2 * a);           /* real part of the root */
        d = b * b - 2 * a * c;       /* discriminant */
        im = sqrt (fabs (d)) / (2 * a); /* imaginary part */
        if (d >= 0.0)                /* positive discriminant */
        {
            x1 = re + im;
            x2 = re - im;
            printf ("Too real roots x1 = %.3f, x2 = %.3f\n", x1, x2);
        }
        else                          /* negative discriminant */
        {
            printf ("Complex roots x1 = (%.3f, %.3f), x2 = (%.3f, %.3f)\n", re, im, re, -im);
        }
    }
    return 0;
}

```

10. Compile and run the program.