1. Develop an algorithm and draw its flow chart to find number of retired people in a village by asking each individual. Assume the village population is 500.

2. Develop an algorithm to decide value of $x$ if $y$ and $z$ are inputs from user. Use the following conditions:

   - If $y < 4.0$, $z > 0.0$, $x = \sqrt{z} \cos(y)$
   - If $y > 4.0$, $z < 0.0$, $x = x^2 y^2$
   - If $y = 4.0$, $z = 0.0$, $x = y^4$

3. Write a C program that finds the perimeter of a rectangle. Use comments for indicating the purpose of your program.

   **Sample Run** *(Italics represents the user input)*
   Enter short side and long side: 1 2
   For short side as 1 cm and long side as 2 cm, perimeter is 6 cm.

4. Correct the errors of the C program given below.

   ```c
   include stdio
   int main void;
   print ('Hello')
   a=b= 3;
   print ('a +b is a+b')
   stop
   ```

5. Write a program to prompt the user to enter a floating number of centimeters, print out the equivalent number of feet (integer) and inches (floating, 1 decimal), with the inches given to an accuracy of one decimal place. Assume that

   - 1 foot = 30.48 cm
   - 1 inch = 2.54 cm
   - 1 foot = 12 inches

   **Sample Run** *(Italics represents the user input)*
   Enter the distance in centimeters: 333.3
   333.3 cm = 19 feet 11.2 inches

6. Write a C program that prompts the user to enter the surface area of a cube, and the program should calculate the volume of that cube. Note that if edge of the square is $a$, then the surface area is $6a^2$, and the volume is $a^3$

   **Sample Run** *(Italics represents the user input)*
   Enter surface area: 412
   Volume = 569.009
7. True/False, fill-in the blanks and other questions

☐ All information that is to be processed by a computer must first be entered into memory via an input.

☐ A list of instructions provided to the computer is called a program.

☐ Statements in a high-level language are converted to statements in machine language by a loader.

☐ ________ words have special meaning in C and cannot be used to name variables.

☐ If the computer is switched off, data in secondary memory is usually not lost.

☐ When a program begins to execute, the contents of the memory cells it uses are initially empty.

☐ A C compiler detects ________ errors.

☐ A syntax error in a program is an error that causes the program to produce incorrect output.

☐ A list of instructions provided to the computer is called a program.

☐ The component of a digital computer that can compare data stored in its registers is the __________.

☐ The object file is created by the __________.

☐ Languages used for writing general-purpose computer programs fall into three broad categories: machine, assembly, and ________.

☐ The word char is a reserved word in C so it cannot be used as a variable name.

☐ Two C statements can be placed on a single line.

☐ The constant 0.15e+6 represents the same value as ________.

☐ A type char literal is enclosed in single quotes; a string literal is enclosed in double quotes.

☐ A C compiler cannot detect ______ errors.

☐ The value of the expression
5 + 6.6 / 2.2 * 0.5 is 6.5

If the type int variable a and the type double variables b and c have values 403, 201.447, and -11.2 respectively, write a single statement that will print the following line of output (for clarity, if a '#' is used to indicate one space).

```plaintext
##403#####201.45####-11.200
```

8. Which of the following are valid identifiers?
   i. R3D3 ii. per-capita iii. phone#
   iv. ice_cream v. 2_aardvarks

   a. i, ii, iv, v
   b. i, iv
   c. i, ii
   d. ii, iv, v
   e. All are valid.

9. Which one of the following expressions does not evaluate to 3?

   - 2 + 16 % 5
   - 7 - 15 / 4
   - 6 * 5 / 10
   - 2 - 4 * 3 + 26 / 2
   - 8 – 5

10. What does the following function call print if a=45, b=123.56789, c=0.00056789?

    ```c
    printf("%5d%11.2f%8.3f\n",a,b, c);
    ```

11. What happens to the fractional part of a type double expression when the expression is assigned to a type int variable?

12. True or False?
   - The following decision structure is invalid:
     ```c
     if x <= y
         printf("%lf", x);
     else
         printf("%lf", y);
     ```
   - The following decision structure is invalid:
     ```c
     if (x <= y) printf("%lf", x);
     else printf("%lf", y);
     ```
   - The following program segment gives x and y the same value if the condition is true:
     ```c
     if (x > y) {
```
If the value of control is 5, the following switch statement will cause a run-time error.

```c
switch (control) {
    case 1:
        printf("one");
        break;
    case 2:
        printf("two");
        break;
    case 3:
        printf("three");
        break;
    case 4:
        printf("four");
}
```

13. For what exact range of values of variable x does the following code segment print the letter 'C'?

```c
if (x <= 200) {
    if (x < 100) {
        if (x <= 0)
            printf("A\n");
        else
            printf("B\n");
    } else
        printf("C\n");
} else
    printf("D\n");
```

14. What is printed by the C statements that follow if the value input is 2?

```c
scanf("%d", &ctl);
switch (ctl) {
    case 0:
    case 1:
        printf("red ");
    case 2:
        printf("blue ");
    case 3:
        printf("green ");
    case 4:
        printf("yellow");
}
printf("\n");
```

15. The following code segment is syntactically correct, but difficult to read. Rewrite the segment using indentation that improves its readability.

```c
if (road_stat == 's')
    if (temp > 0)
        printf("Roads wet.\n");
    else
        printf("Roads icy.\n");
    else
        printf("Roads dry.\n");
```

16. Rewrite the following if statement as an equivalent switch statement. The variable digit is of type int.

```c
if (digit == 0)
    value = 3;
else if (digit == 1)
    value = 3;
else if (digit == 2)
    value = 6;
else if (digit == 3)
    value = 9;
```
17. Rewrite the if statement below using only the relational operator < in all conditions. Assume that the value of score is between 0 and 100 inclusive.

```c
if (score >= 90)
    printf("A\n");
else if (score >= 80)
    printf("B\n");
else
    printf("C\n");
```

18. Evaluate the expressions below: If a=5, b=10, c=15 and flag=1

```c
c == a+b || !flag  
(a !=7 && flag || c >= 6  
!(b <= 12) && a % 2 ==0  
(3*8/2+1)%2-1)/2  
3+(7*2-9)/2*3-31/2  
36 / (4 * 2) * 2 * 2 – 20
```

19. The National Earthquake Information Center has asked you to write a program implementing the following decision table to characterize an earthquake based on its Richter scale number:

- n < 5.0: Little or no damage
- 5.0 <= n < 5.5: Some damage
- 5.5 <= n < 6.5: Serious damage
- 6.5 <= n < 7.5: Disaster
- n >= 7.5: Catastrophe

Can you handle this problem with switch statement? Yes or No?

20. Printing with format codes (# stands for a space):

<table>
<thead>
<tr>
<th>Value</th>
<th>Placeholder</th>
<th>display</th>
</tr>
</thead>
<tbody>
<tr>
<td>--99.42</td>
<td>%7.2f</td>
<td>#99.42</td>
</tr>
<tr>
<td>0.123</td>
<td>%6.2f</td>
<td>#0.12</td>
</tr>
<tr>
<td>99.999</td>
<td>%6.2f</td>
<td>100.00</td>
</tr>
<tr>
<td>3.14159</td>
<td>%5.2f</td>
<td>#3.14</td>
</tr>
<tr>
<td>3.1415</td>
<td>%5.4f</td>
<td>3.1416</td>
</tr>
<tr>
<td>-0.006</td>
<td>%4f</td>
<td>-0.0060</td>
</tr>
<tr>
<td>-0.006</td>
<td>%4.2f</td>
<td>-0.01</td>
</tr>
<tr>
<td>-234</td>
<td>%2d</td>
<td>-234</td>
</tr>
<tr>
<td>-234</td>
<td>%5d</td>
<td>#234</td>
</tr>
</tbody>
</table>

21. What will be the output of the program segments?

```
int a=1;
if (a>1<=0 || a>2 && a==a+1 )
a=3;
else
    a=4;
printf("%d",a);
```

```
.....
int a=1, b=10, c=100;
if ( !(3!4))
a=2;
if( 3>4 || 5<7-1 )
b=20;
if ( !(3-4))
c=200;
printf("%d",a+b+c);
```

```
int m=1, n=2;
if ((m==0 || n==2) && m<=n)
    printf("OK ");
else
    printf("Fail ");
if ((n>=1 && m==2 || n<<m))
    printf("OK");
else
    printf("Fail");
```

```