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Loop/Repetition Statements
Lecture 4 Assignment

1.

```c
/* ~~~~~~~~~~~~~~~~~~~~~~~~~
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~~~~~~~~~~~~~~~~~~~~~~~~~ */

#include <stdio.h>

int main(void) {
    int i;

    i = 1;
    while (i <= 128) {
        printf("%d ", i);
        i *= 2;
    }

    return 0;
}
```

```
1 2 4 8 16 32 64 128
```

Output:
1 2 4 8 16 32 64 128

2.

```c
/* ~~~~~~~~~~~~~~~~~~~~~~~~~
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~~~~~~~~~~~~~~~~~~~~~~~~~ */

#include <stdio.h>

int main(void) {
    int i, inp;

    printf("Input i: ");
    scanf("%d", &inp);

    printf("WHILE\n");
    i = inp;
    while (i<10) {
        printf("%d ", i);
        i++;
    }

    i = inp;
    printf("\nFOR\n");
    for (; i<10;) {
        printf("%d ", i);
        i++;
    }

    i = inp;
    printf("\nDO WHILE\n");
    do {
        printf("%d ", i);
        i++;
    } while (i<10);

    return 0;
}
```

```
Input i: 0
WHILE
0 1 2 3 4 5 6 7 8 9
FOR
0 1 2 3 4 5 6 7 8 9
DO WHILE
0 1 2 3 4 5 6 7 8 9
```

```
Input i: 15
WHILE

FOR

DO WHILE
15
```

All statements are equivalent whenever `(i<10)` is true. However, statement c, which is a do-while loop, deviates whenever `(i<10)` is false. This is because the do-while loop will still execute its body even if the condition was not satisfied, while the other statements will never execute their bodies. Thus, statement c is the outlier of the three.

3.

```c
/* ~~~~~~~~~~~~~~~~~~~~~~~~
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~~~~~~~~~~~~~~~~~~~~~~~~ */

#include <stdio.h>

int main(void) {
    for (int i=1; i<=128; i*=2) {
        printf("%d ", i);
    }
    return 0;
}
```

```
1 2 4 8 16 32 64 128
```

4.

```c
/* ~~~~~~~~~~~~~~~~~~~~~~~~
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~~~~~~~~~~~~~~~~~~~~~~~~ */

#include <stdio.h>

int main(void) {
    int n, y;

    printf("Input n: ");
    scanf("%d", &n);

    if (n>=0) {         // for positive, print integer
        for (y = 1; n>0; n--) {
            y*=2;
        }
        printf("2^n = %d", y);
    } else {            // for negative, print fraction
        n*=-1;
        for (y = 1; n>0; n--) {
            y*=2;
        }
        printf("2^n = 1/%d", y);
    }

    return 0;
}
```

```
Input n: 8
2^n = 256
```

```
Input n: -9
2^n = 1/512
```

```
Input n: 0
2^n = 1
```

5.

```c
/* ~~~~~~~~~~~~~~~~~~~~~~
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~~~~~~~~~~~~~~~~~~~~~~ */

#include <stdio.h>

int valid_input(int min, int max) {
    /* Ensures input is within validity range from
    given minimum to given maximum */
    int inp;

    while(1) { // exits only when inp is within range
        printf("\nInput [%d-%d]: ", min, max);
        scanf("%d", &inp);

        if (inp>=min && inp<=max) {     // valid, within range
            return inp;
        } else {                        // invalid
            printf("Invalid input! Must be from %d to %d only. Try again.", min, max);
            // loop back to Input
        }
    }
}
```

```c
int main(void) {
    int days, start, n;

    /*~~~ INPUTS ~~~*/
    printf("How many days in the month?");
    days = valid_input(28, 31);
    printf("\nWhich day of the week to start on?\n    1.) Sunday\n    2.) Monday\n    3.) Tuesday\n    4.) Wednesday\n    5.) Thursday\n    6.) Friday\n    7.) Saturday");
    start = valid_input(1, 7);

    /*~~~ OUTPUT CALENDAR ~~~*/
    printf("\nSu Mo Tu We Th Fr Sa\n");

    // Start of Week Spacing
    for (n=1; n<start; n++) {
        printf("   ");
    }

    // Days
    start = (8-start)%7; // signifies end of row

    for (n=1; n<=days; n++) {
        printf("%2d ", n);

        // when end of row, print new line
        if (n%7==start) {
            printf("\n");
        }
    }

    return 0;
}
```

```
How many days in the month?
Input [28-31]: 0
Invalid input! Must be from 28 to 31 only. Try again.
Input [28-31]: 27
Invalid input! Must be from 28 to 31 only. Try again.
Input [28-31]: 32
Invalid input! Must be from 28 to 31 only. Try again.
Input [28-31]: 29
```

```
Which day of the week to start on?
    1.) Sunday
    2.) Monday
    3.) Tuesday
    4.) Wednesday
    5.) Thursday
    6.) Friday
    7.) Saturday
Input [1-7]: 0
Invalid input! Must be from 1 to 7 only. Try again.
Input [1-7]: 8
Invalid input! Must be from 1 to 7 only. Try again.
Input [1-7]: 5
```

```
Su Mo Tu We Th Fr Sa
                1  2  3
 4  5  6  7  8  9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29
```

```
How many days in the month?
Input [28-31]: 28

Which day of the week to start on?
    1.) Sunday
    2.) Monday
    3.) Tuesday
    4.) Wednesday
    5.) Thursday
    6.) Friday
    7.) Saturday
Input [1-7]: 6
```

```
Su Mo Tu We Th Fr Sa
                1  2
 3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28
```