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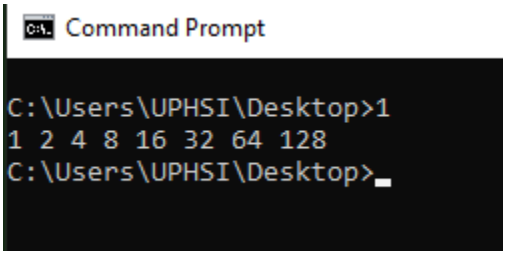
CMSC 21 – Section 1
23 June 2023

Machine Problem

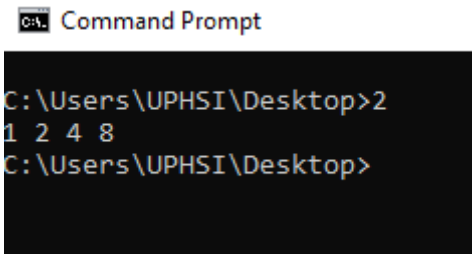
1.

```c
#include <stdio.h>

int main(void)
{
    int i;

    i = 1;

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

    return 0;
}


//its output will be "1 2 4 8 16 32 64 128"
//in other words, 2^0, 2^1, 2^2,...,2^7
```



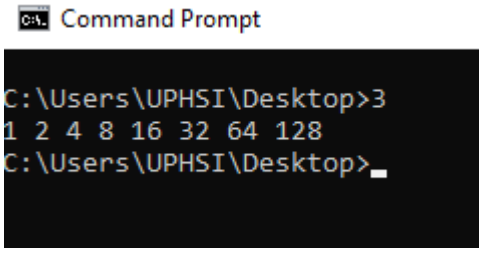
2.

```c
//c) do {...} while (i < 10);

#include <stdio.h>

int main(void) {
    int i = 1;

    do {
        printf("%d ", i);
        i *= 2;
    } while (i < 10);

    return 0;
}
```



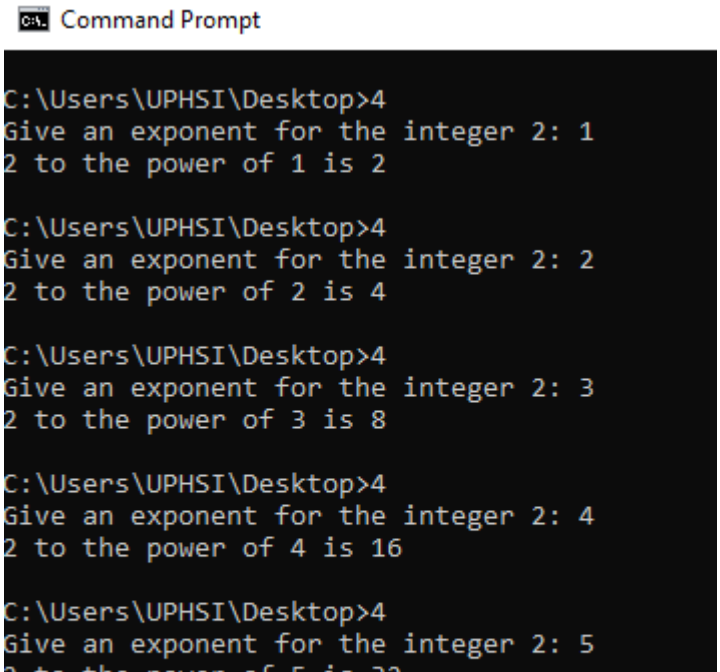
3.

```c
//convert item 1 into an equivalent for statement which prints 2^0 - 2^7

#include <stdio.h>

int main() {
    int i;

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

    return 0;
}
```



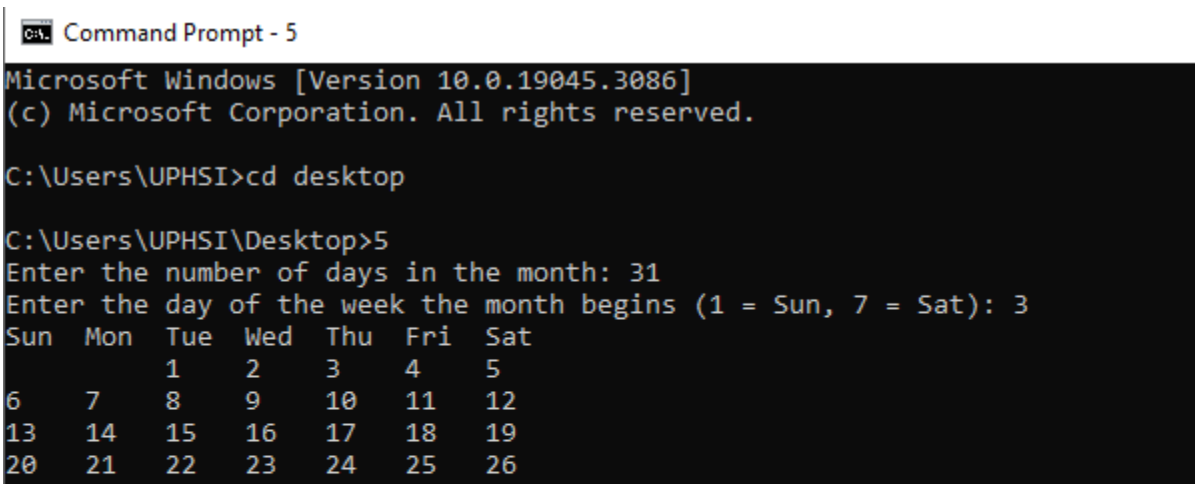
4.

```c
//asks the user for an exponent that 2 is to be raised by

#include <stdio.h>

int main() {
    int exponent, result = 1;

    printf("Give an exponent for the integer 2: ");
    scanf("%d", &exponent);

    for (int i = 0; i < exponent; i++) {
        result *= 2;
    }

    printf("2 to the power of %d is %d\n", exponent, result);

    return 0;
}

```



5.

```c
#include <stdio.h>

int main() {
    int days, startmonth;

    do {
        printf("Enter the number of days in the month: "); // asks user for the number of days
        scanf("%d", &days);

        if (days < 28 || days > 31) {
            printf("Invalid number of days. Please enter a value between 1 and 31.\n");
        }
    } while (days < 28 || days > 31);

    do {
        printf("Enter the day of the week the month begins (1 = Sun, 7 = Sat): "); // asks user which day of the week the month start
        scanf("%d", &startmonth);

        if (startmonth < 1 || startmonth > 7) {
            printf("Invalid start day. Please enter a value between 1 and 7.\n");
        }
    } while (startmonth < 1 || startmonth > 7);

    printf("Sun  Mon  Tue  Wed  Thu  Fri  Sat\n"); // prints the days of the week on top of the calendar

    for (int i = 0; i < startmonth - 1; i++) { // prints spaces before the first day of the month as specified by the user
        printf("     ");
    }

    for (int day = 1; day <= days; day++) { // prints the days in the month
        printf("%-5d", day);

        if ((startmonth + day - 1) % 7 == 0) { // moves to the next line after reaching Saturday
            printf("\n");
        }
    }

    return 0;
}
```



6. What isn't specified will be then deemed as false. It is said that only the first and third pathways are open. Thus, my answers for both letters are:

a. bool pathway[] = {[0] = true, [2] = true};

b. bool pathway[] = {true, false, true};