CPS 188 Lab 5 : Pointers & Advanced Functions

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Problem 1:

main.c

```c
#include <stdio.h>

void findValues(int num1, int num2, int num3, int *highest, int *lowest, int *middle) {
    if (num1 >= num2 && num1 >= num3) {
        *highest = num1;
        if (num2 >= num3) {
            *middle = num2;
            *lowest = num3;
        } else {
            *middle = num3;
            *lowest = num2;
        }
    } else if (num2 >= num1 && num2 >= num3) {
        *highest = num2;
        if (num1 >= num3) {
            *middle = num1;
            *lowest = num3;
        } else {
            *middle = num3;
            *lowest = num1;
        }
    } else {
        *highest = num3;
        if (num1 >= num2) {
            *middle = num1;
            *lowest = num2;
        } else {
            *middle = num2;
            *lowest = num1;
        }
    }
}

int main() {
    int num1, num2, num3, highest, lowest, middle;

    printf("Enter an integer: ");
    scanf("%d", &num1);

    printf("Enter an integer: ");
    scanf("%d", &num2);

    printf("Enter an integer: ");
    scanf("%d", &num3);

    findValues(num1, num2, num3, &highest, &lowest, &middle);

    printf("%d %d %d\n", lowest, middle, highest);

    return 0;
}
```

```
Enter an integer: 56
Enter an integer: 78
Enter an integer: 23
23 56 78


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter an integer: 45
Enter an integer: -20
Enter an integer: 22
-20 22 45


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter an integer: -80
Enter an integer: -40
Enter an integer: -250
-250 -80 -40


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter an integer: 8
Enter an integer: 0
Enter an integer: 2
0 2 8


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter an integer: 55
Enter an integer: 55
Enter an integer: 55
55 55 55


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter an integer: 88
Enter an integer: 77
Enter an integer: 66
66 77 88


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter an integer: -8
Enter an integer: 33
Enter an integer: -8
-8 -8 33


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter an integer: 12
Enter an integer: 13
Enter an integer: 1
1 12 13


...Program finished with exit code 0
Press ENTER to exit console.
```

Problem 2:

main.c

```c
#include <stdio.h>

/* constants for distance ranges in km */
const double MOON_PERIGREE = 363104;
const double MOON_APOGEE = 405696;
const double MARS_PERIGREE = 54600000;
const double MARS_APOGEE = 401000000;
const double VENUS_PERIGREE = 38000000;
const double VENUS_APOGEE = 261000000;

/* constants for speed conversions */
const double KM_TO_M = 1000;
const double H_TO_S = 3600;

/* Function to calculate travel time to the Moon */
void moon_travel_time(double speed) {
    double perigree_time = MOON_PERIGREE / (speed * KM_TO_M / H_TO_S);
    double apogee_time = MOON_APOGEE / (speed * KM_TO_M / H_TO_S);
    printf("Travel time to the moon at %.0f km/h:\n", speed);
    printf("Perigree: %.2f hours\n", perigree_time);
    printf("Apogee: %.2f hours\n\n", apogee_time);
}

/* Function to calculate travel time to Mars */
void mars_travel_time(double speed) {
    double perigree_time = MARS_PERIGREE / (speed * KM_TO_M / H_TO_S);
    double apogee_time = MARS_APOGEE / (speed * KM_TO_M / H_TO_S);
    printf("Travel time to mars at %.0f km/h:\n", speed);
    printf("Perigree: %.2f hours\n", perigree_time);
    printf("Apogee: %.2f hours\n\n", apogee_time);
}

/* Function to calculate travel time to Venus */
void venus_travel_time(double speed) {
    double perigree_time = VENUS_PERIGREE / (speed * KM_TO_M / H_TO_S);
    double apogee_time = VENUS_APOGEE / (speed * KM_TO_M / H_TO_S);
    printf("Travel time to venus at %.0f km/h:\n", speed);
    printf("Perigree: %.2f hours\n", perigree_time);
    printf("Apogee: %.2f hours\n\n", apogee_time);
}
```

```c

/* Main Function to run the program */
int main () {
    int option;
    double speed;

    do {
        printf("Menu:\n");
        printf("1. Travelling to the Moon\n");
        printf("2. Travelling to Mars\n");
        printf("3. Travelling to Venus\n");
        printf("4. Exit Program\n");
        printf("Choose an option: ");
        scanf("%d", &option);

        switch (option) {
            case 1:
                printf("Enter travelling speed in km/h: ");
                scanf("%lf", &speed);
                moon_travel_time(speed);
                break;
            case 2:
                printf("Enter travelling speed in km/h: ");
                scanf("%lf", &speed);
                mars_travel_time(speed);
                break;
            case 3:
                printf("Enter travelling speed in km/h: ");
                scanf("%lf", &speed);
                venus_travel_time(speed);
                break;
            case 4:
                printf("Exiting Program.\n");
                break;
            default:
                printf("Invalid Option. Please choose again.\n");
        }
    } while (option != 4);

    return (0);
}
```

```
Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 1
Enter traveling speed in km/h: 100
Travel time to the Moon at 100 km/h:
Perigee: 13071.74 hours
Apogee: 14605.06 hours

Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 1
Enter traveling speed in km/h: 500
Travel time to the Moon at 500 km/h:
Perigee: 2614.35 hours
Apogee: 2921.01 hours
```

```
Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 1
Enter traveling speed in km/h: 41000
Travel time to the Moon at 41000 km/h:
Perigee: 31.88 hours
Apogee: 35.62 hours

Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 4
Exiting program.


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 2
Enter traveling speed in km/h: 100
Travel time to Mars at 100 km/h:
Perigee: 1965600.00 hours
Apogee: 14436000.00 hours

Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 2
Enter traveling speed in km/h: 500
Travel time to Mars at 500 km/h:
Perigee: 393120.00 hours
Apogee: 2887200.00 hours
```

```
Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 2
Enter traveling speed in km/h: 41000
Travel time to Mars at 41000 km/h:
Perigee: 4794.15 hours
Apogee: 35209.76 hours

Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 4
Exiting program.


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 3
Enter traveling speed in km/h: 100
Travel time to Venus at 100 km/h:
Perigee: 1368000.00 hours
Apogee: 9396000.00 hours

Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 3
Enter traveling speed in km/h: 500
Travel time to Venus at 500 km/h:
Perigee: 273600.00 hours
Apogee: 1879200.00 hours
```

```
Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 3
Enter traveling speed in km/h: 41000
Travel time to Venus at 41000 km/h:
Perigee: 3336.59 hours
Apogee: 22917.07 hours

Menu:
1. Traveling to the Moon
2. Traveling to Mars
3. Traveling to Venus
4. Exit program
Choose an option: 4
Exiting program.


...Program finished with exit code 0
Press ENTER to exit console.
```