

Hunter Poole
CSCI 155 HW1, Problem 1

1. We want to find the third angle of a triangle, given two of the angles. Remember the sum of all three angles is equal to 180 degrees. User will be asked to input two angles and will then calculate and display the third angle.

Three Step Analysis:

- A. Ask for two angles. Ensure each angle and the sum of both is $0 < \text{angle} < 180$, such that there is room for a third angle. The sum of all three must equal exactly 180. Provide the third angle given the first two.

B.

INPUT	OUTPUT	EQUATIONS
Angle 1	Angle 3	Difference $(180 - A1 - A2)$
Angle 2	"ERROR"	while $(A1 \leq 0 \parallel A1 \geq 180)$ while $(A2 \leq 0 \parallel A2 \geq 180)$ while $(A1 + A2 \geq 180)$

- C. Limits / Constraints:

- a. Provided angles (A1, A2) must be $0 < A < 180$.
- b. The sum of both angles must not be ≥ 180 .
- c. The sum of all three angles must = 180.

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```
write "Please provide your first angle:"  
read A1
```

```
while (A1 <= 0 || A1 >= 180) do:  
    write "ERROR: Please ensure your first angle is a positive number, and is less than 180 degrees."  
    write "Please provide your first angle:"  
    read A1  
end while
```

```
write "Please provide your second angle:"  
read A2
```

```
while (A2 <= 0 || A2 >= 180) do:  
    write "ERROR: Please ensure your first angle is a positive number, and is less than 180  
degrees."  
    write "Please provide your second angle:"  
    read A2  
end while
```

```
while (A1 + A2 >= 180) do:  
    write "ERROR: Please ensure your first two angles do not add up to 180 degrees or more"  
    write "Please provide your second angle:"  
    read A2  
end while
```

```
A3 = 180 - (A1 + A2)  
write "The third angle is " + A3 + " degrees."
```

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CSCI 155 HW1, Problem 2

2. Given the Radius (R) of a circle you want to calculate the Volume (V) of a sphere and the Surface Area (A) of that sphere. The equations are for $V = \frac{4}{3}\pi R^3$ and Surface Area $A = 4\pi R^2$.

Three Step Analysis:

A. Given a radius, use the following two formulas to output the volume and the area of the sphere,, respectively. Presumed user will provide the radius.

a. $V = \frac{4}{3}\pi R^3$

b. $A = 4\pi R^2$

B.

INPUT	OUTPUT	EQUATIONS
Radius of a circle	Volume of the sphere (number^3)	$V = \frac{4}{3}\pi R^3$
	Area of the sphere (number^2)	$A = 4\pi R^2$

C. Limits / Constraints:

- a. Inputs and outputs must be positive (can't have a negative radius, volume, or area)
 - i. Since the user may only enter the radius, that is the only data point that needs to be checked.

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CSCI 155 HW1, Problem 2

```
write "Enter the radius of the circle: "  
read Radius
```

```
while (Radius <= 0 )  
    write "Please enter a positive number: "  
    read Radius  
end while
```

```
// Volume =  $\frac{4}{3}(\pi)r^3$   
// Surface Area =  $4(\pi)r^2$   
Volume = Radius * Radius * Radius * 3.1415926 * 4 / 3  
Surface_Area = Radius * Radius * 3.1415926 * 4
```

```
write "The volume of the sphere is: " + Volume + "^3"  
write "The surface area of the sphere is: " + Surface_Area + "^2"
```

Hunter Poole
CSCI 155 HW1, Problem 3

3. A problem that will convert a total number of seconds into the corresponding number of days, hours, minutes and seconds left over. For example, if you enter 102,345 seconds, then it would display "1 day, 4 hours, 25 minutes and 45 seconds". (Hint, need to find out many seconds in a day, in an hour and in a minute. Also use the mod and div operators.

Three Step Analysis:

- A. Take the number of seconds from the user, and divide it into four buckets. Values must be represented as integers. Partial days to be represented by hours. Partial hours to be represented by minutes. Partial minutes to be represented by seconds. No partial seconds accepted.
- a. Days = ?
 - b. Hours = ?
 - c. Minutes = ?
 - d. Seconds = ?

INPUT	OUTPUT	EQUATIONS
Number of seconds	Days	while (seconds <= 0)
	Hours	days = seconds / 86400
	Minutes	days_remainder = seconds % 86400
	Seconds	hours = days_remainder / 3600
		hours_remainder = days_remainder % 3600
		minutes = hours_remainder / 60
		minutes_remainder = hours_remainder % 60
		seconds_result = minutes_remainder

- B. Limits / Constraints:
- a. Inputs must be positive - will not compute negative time for this problem.

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CSCI 155 HW1, Problem 3

```
write "Enter the number of seconds: "  
read Seconds
```

```
while (Seconds <= 0 )  
    write "Please enter a positive number of seconds: "  
    read Seconds  
end while
```

```
Days_Result = Seconds / 86400  
write "Days: " + Days_Result
```

```
Days_Remainder = Seconds % 86400  
Hours_Result = Days_Remainder / 3600  
write "Hours: " + Hours_Result
```

```
Hours_Remainder = Days_Remainder % 3600  
Minutes_Result = Hours_Remainder / 60  
write "Minutes: " + Minutes_Result
```

```
Minutes_Remainder = Hours_Remainder % 60  
Seconds_Result = Minutes_Remainder  
write "Seconds: " + Seconds_Result)
```

Hunter Poole
CSCI 155 HW1, Problem 4

4. User enters two integers and displays both numbers, but the largest one first. Example, if user enters 10 and 54, will display, "Two numbers are, 54 10".

Three Step Analysis:

A. Take two numbers and sort them according to size. Print result

INPUT	OUTPUT	EQUATIONS
Integer 1	"The two numbers are: "	If (num1 > num2)
Integer 2	Ordered list (X, X1)	If (num2 > num1)

B. Limits / Constraints:

- a. Largest number must be displayed first
- b. Will only accept integers

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CSCI 155 HW1, Problem 4

```
write "Enter the first number: "  
read Num1
```

```
write "Enter the second number: "  
read Num2
```

```
if (Num1 > Num2 )  
    write "The two numbers are: " + Num1 + ", " + Num2  
else  
    write "The two numbers are: " + Num2 + ", " + Num1  
end if
```


Hunter Poole
CSCI 155 HW1, Problem 5

5. A problem that determines if an entered number is greater than 100 or less than 100 and displays appropriate response after each number. Will continue to have user enter numbers and display appropriate response until user enters a zero. Will keep looping until the user enters 0.

Three Step Analysis:

- A. Take a number from the user. Determine if it is less than or greater than 100. Output result. User will enter "0" when they are finished. Algorithm to loop until "0"

INPUT	OUTPUT	EQUATIONS
Numbers < or > 100	"(x) is greater than 100"	if (number < 100)
0 (stop)	"(x) is less than 100"	if (number > 100)
		while (number != 0)
		If (number == 0)

- B. Limits / Constraints:
- Continuous loop until user enters "0". "0" will be "exit code".
 - Output will tell the user if the number they provided is greater than or less than 100.

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CSCI 155 HW1, Problem 5

```
write "Enter a number below. Enter 0 to exit."  
read Number  
  
while (Number != 0 )  
    if (Number > 100)  
        write "The number is greater than 100."  
        write "Enter a number: "  
        read Number  
    else  
        write "The number is less than 100."  
        write "Enter a number: "  
        read Number  
end while  
  
if (Number == 0)  
    write "Exit successful."
```

Hunter Poole
CSCI 155 HW1, Problem 6

6. Write a problem that will display the squares of numbers from 2 up to 10, will display the number along with the square. Output will look similar to following:

2 4
3 9
4 16
5 25
6 36

and so on, up to 10.

Three Step Analysis:

- A. Take the numbers 2-10 and multiply them by themselves. Display the original number and the result.

INPUT	OUTPUT	EQUATIONS
From a user? None	2-10	for (i = 2; i <= 10; i++)
Numbers 2-10 baked in	4, 9, 16, 25, 36, 49, 64, 81, 100	i_squared = i * i
		write "i + " <---> " + i_squared"

- B. Limits / Constraints:
- a. Inputs and outputs must be positive (can't have a negative radius, volume, or area)
 - i. Since the may only enter the radius, that is the only data

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CSCI 155 HW1, Problem 6

```
for (i = 2; i <= 10; i++)  
    I_Squared = i * i  
    write "i + " <---> " + I_Squared"
```

// Wasn't quite sure how to write the "for (Integer i = 2; i <= 10; i++) {}" loop in an informal manner. My apologies if this is too "code-like" for the assignment.