EXERCISE 2 GUIDED SOLUTION

To draw the object in Exercise 2 (BB→Learning Resources→LAB→ UNIT 6 - Pg 135 & 36)

Launch AutoCAD 2020 and do all the 8 settings and insert the 6 frequently used toolbars (See Fig 1) as highlighted **in UNIT 1 & 1A in Blackboard (BB)→ Learning Resources→ LAB** accordingly:

1. **Activate Snap, Grid & Object Snap in Status Toolbar**
2. **Set Grid & Snap spacing, Grid Style, Grid Behaviour according to UNIT 1**
3. **Use Default A3 size workspace. Leave it as A3 size paper (420 mm x 210mm) as shown in Fig 1, so no need to set LIMITS.**
4. **Set Text Style= Times New Roman**
5. **Set Dimension Scale = 1.5 (Keyboard shortcut, Type dimscale in AutoCAD command)**
6. **Set Dimension Style accordingly to UNIT 1**
7. **Set Layers: Text, Dimension, Solid, Center and Hidden according to UNIT 1**
8. **Set Linetype Scale (Keyboard shortcut =lts) = 0.5**

Insert all the **6 frequently used toolbars** shown in **UNIT 1A**:

1. **Draw**
2. **Modify**
3. **Draw Order**
4. **Dimension**
5. **Layers**
6. **Properties**

Next **open** the file **EXERCISE 1B** shown Fig 1:

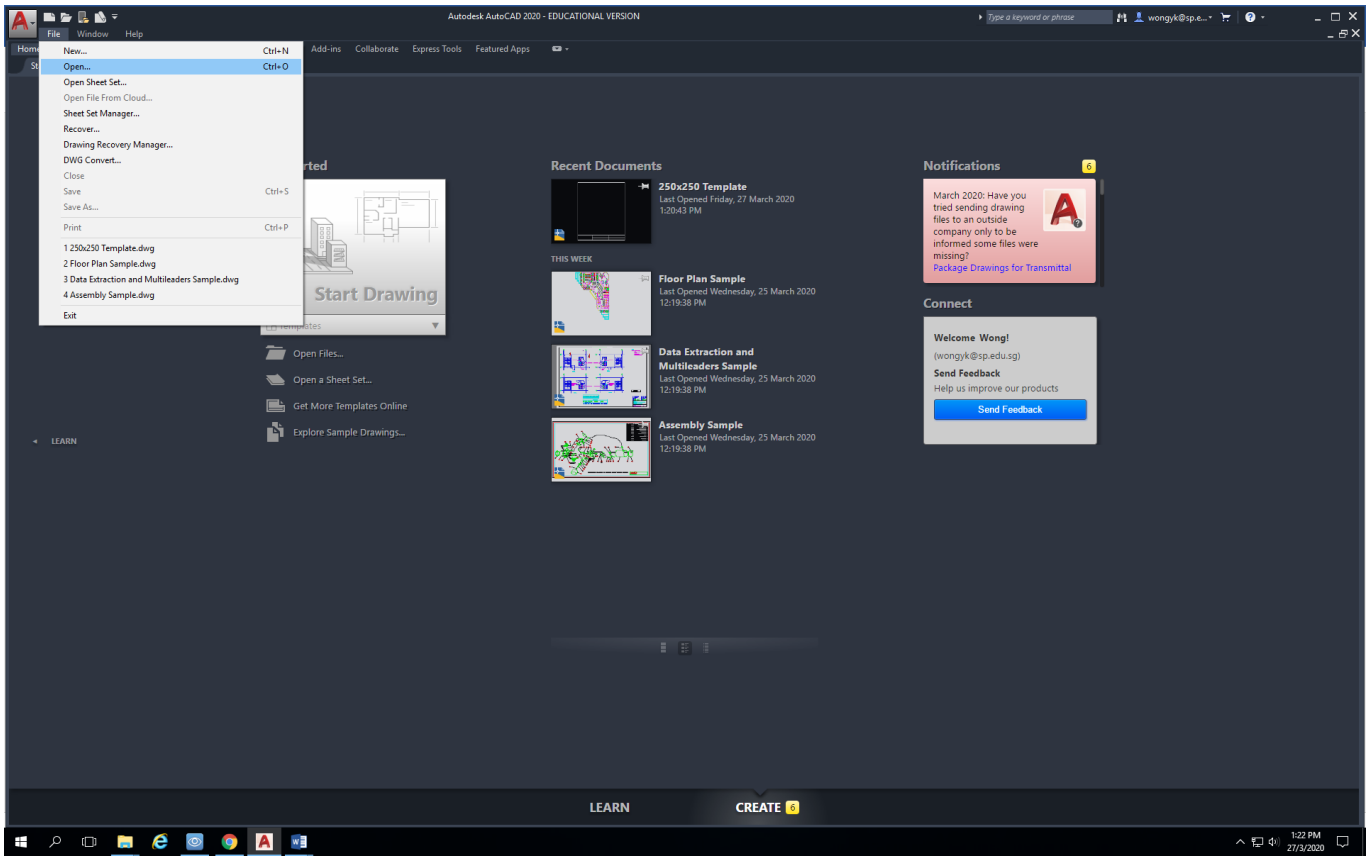

FIG 1

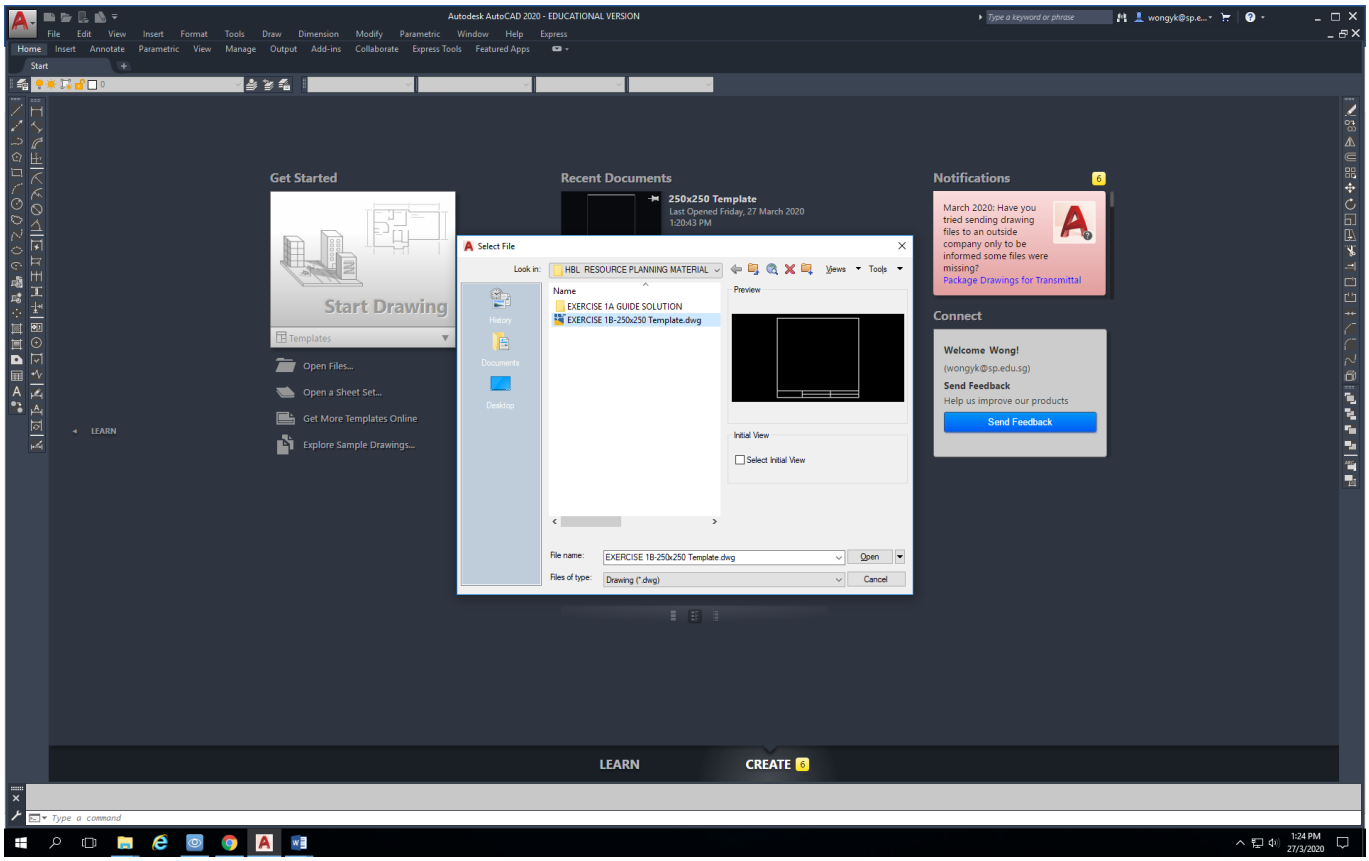

FIG 2

1. A dialog box appears, click the file: EXERCISE 1B, and then click **open**
2. See Fig 2 for the steps shown

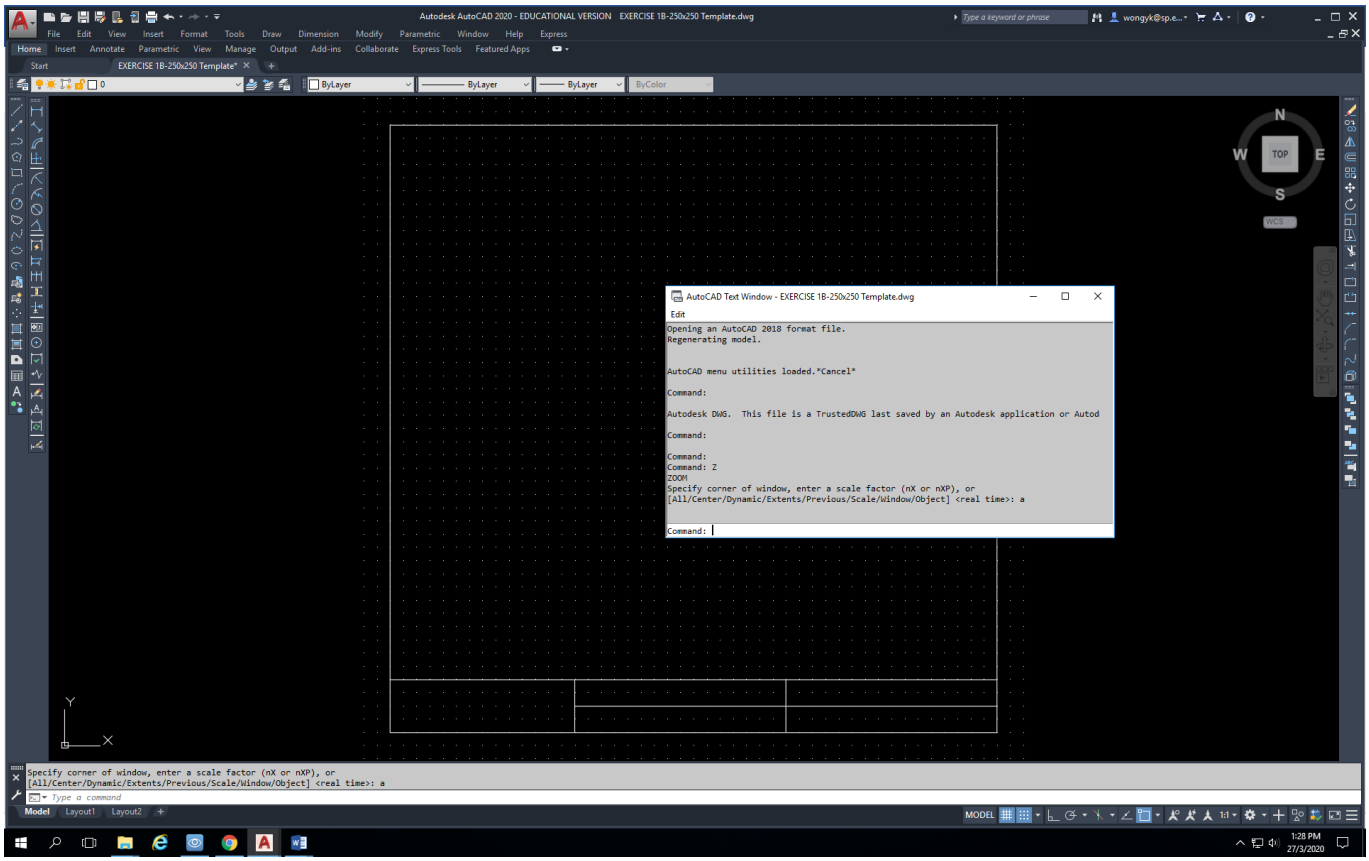

FIG 3

1. The file: **EXERCISE 1B** appears with the 250mm x 250mm Template drawing as done in Week 1
2. Next in command bar, Type **Zoom**, click=**All**, and then **enter**
3. The drawing will be positioned centre of the workspace
4. See Fig 3 for the steps shown.

Exercise 2

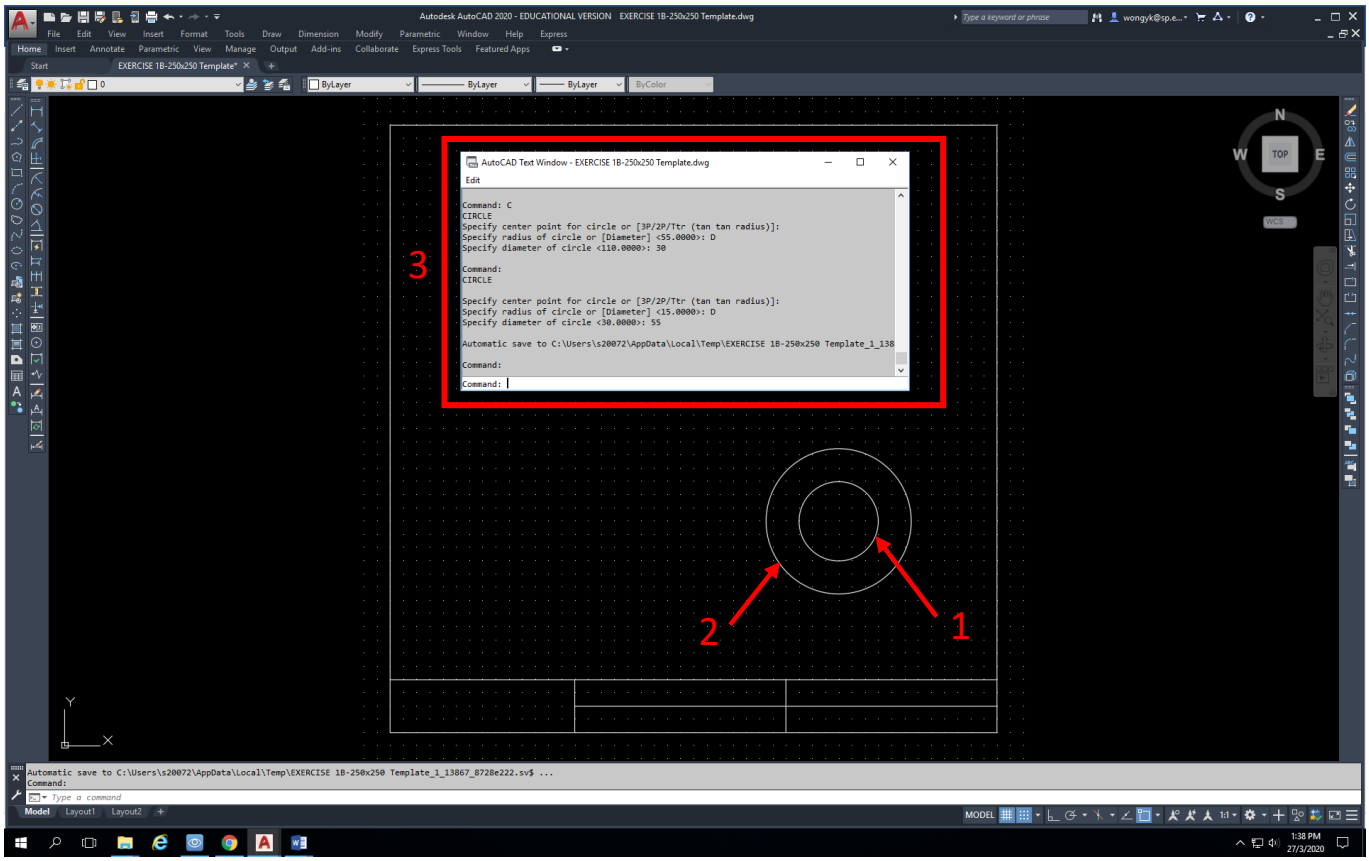

FIG 4

1. Draw the lower right set of circles (Diameter 30mm and 55mm). This circle is drawn first as it can be seen that the other 2 sets of circle have the dimensions with reference to this circle drawn.
2. Circle command:
    i. Type **c** (Keyboard shortcut)
    ii. Click **Diameter** in Command bar
    iii. Type **30**, then **enter** [Circle shown in **(1)**]
    iv. Click **enter** again to get back to command circle (Shortcut)
    v. Click **diameter** in command bar
    vi. Type **55**, then enter [Circle shown in **(2)**]
    vii.
3. See Fig 4 for steps shown **(3)** to draw 2 concentric circles

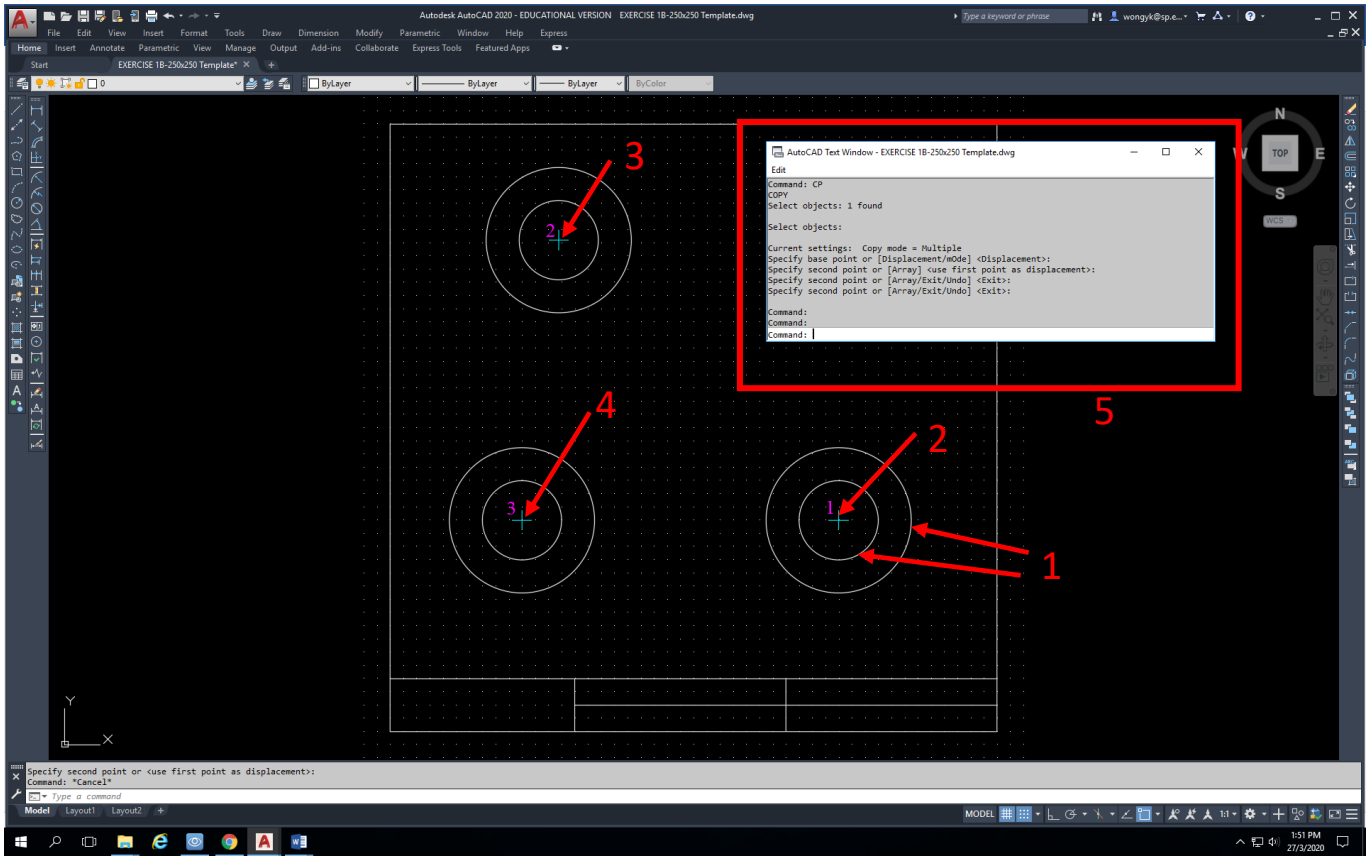

FIG 5

1. Next, copy Set 1 circles to position it at 2 and 3.
2. Method:
    i. Type **cp** (keyboard shortcut to copy)
    ii. Move mouse & **Click on the 2 circles** in Set 1 **(1)**
    iii. Base Point: **click on the centre of set 1** circles **(2)** by moving cursor near towards the circle. The centre appears if you have check the box for centre in Object Snap at status toolbar (or press F3 in keyboard)
    iv. First point of Displacement **(3),** type: **@150<135.** This means @ =represents reference to centre of set 1 circles, 150= represents 150mm distance from centre of set 1 circles, < = represents angle, 135 = represents direction of set 2 circles is 135 degrees from set 1 circles centre (Horizontal direction towards right = 0 degrees)
    v. Similar, continue with second displacement point **(4)**: **@120<180** to represent set 3 circles is 120mm away from set 1 circles in direction 180 degrees.
    vi. Then click **enter** to complete the command
    vii. The steps **(5)** and 3 sets of circles are shown in Fig 5.

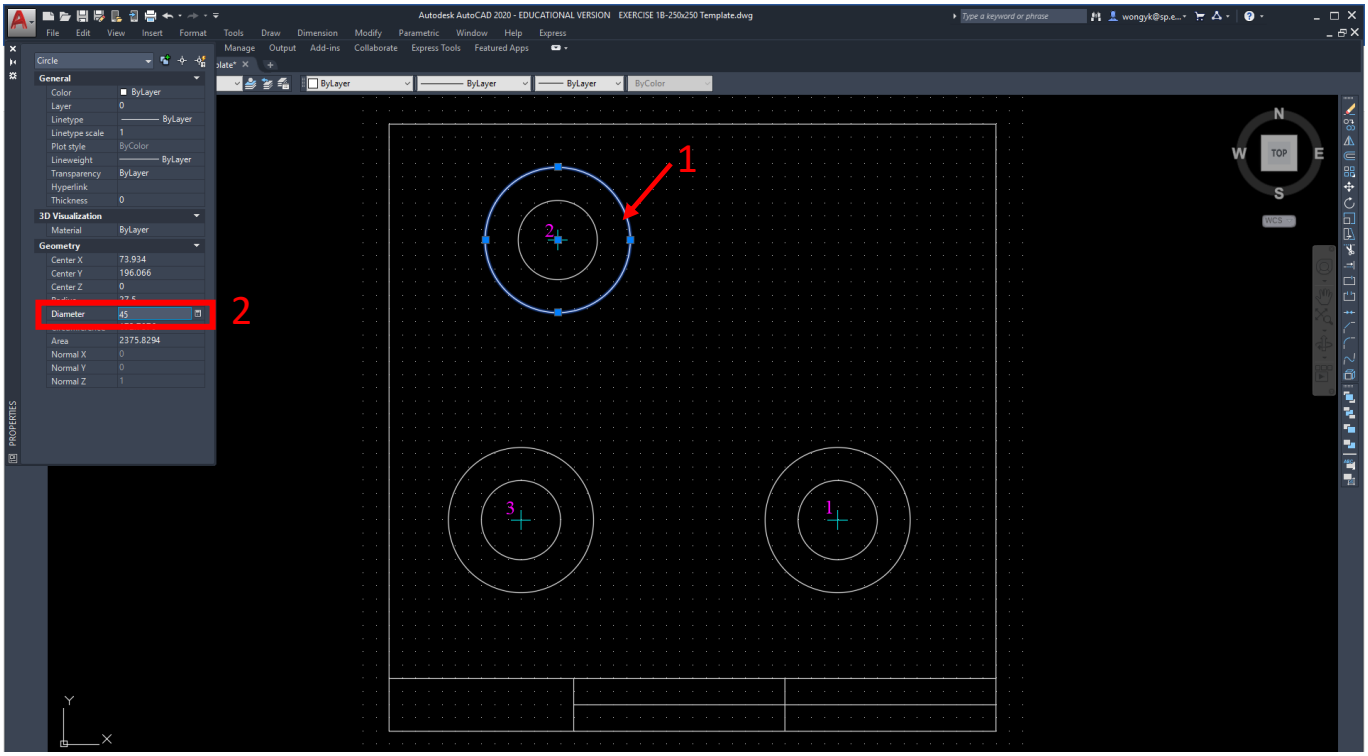

FIG 6

1. Next, Change the diameter of set 2 circle (Outer circle diameter= 45)
2. Method:
    i. Type **ch** (Keyboard shortcut for Change)
    ii. A dialog box appears
    iii. Click on the outer circle in set 2 ….. (1)
    iv. Click on the **diameter** in dialog box and change to **45 … (2)**
    v. See Fig 6 for the steps from (i) to (iv)

vi. Then **enter** and the outer circle **(1)** of set 2 is changed to diameter =**45**mm

vii. See Fig 7 below to view the outer circle diameter of set 2 has been changed to 45mm

viii. Then press **Esc** (Top right hand corner key) in Keyboard

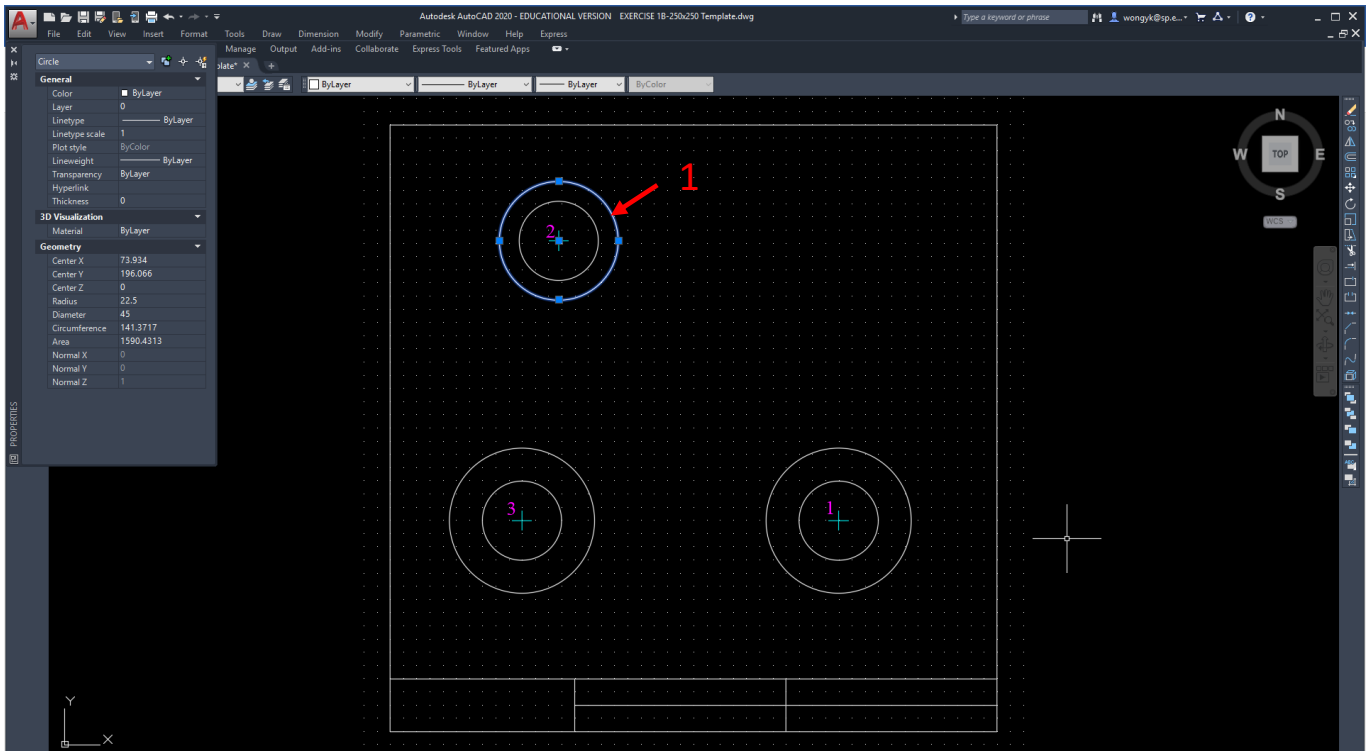

FIG 7

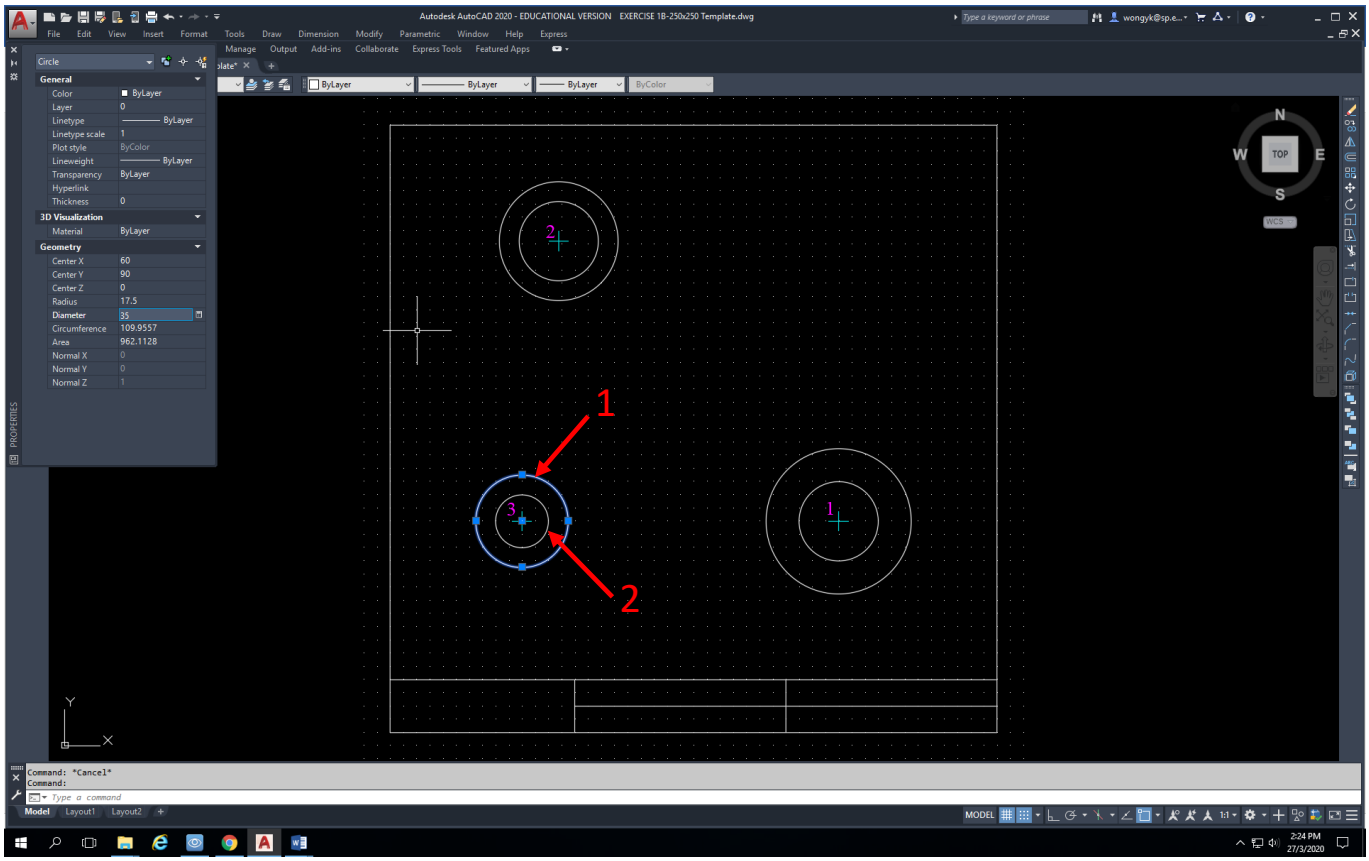

FIG 8

1. Similarly, change the set 3 circles with outer circle **(1)** diameter = **35**mm and inner circle **(2)** diameter = **20**mm
2. Using the same method as shown in Fig 6 & 7, Change the inner circle diameter = 20mm and outer circle diameter = 35mm
3. See Fig 8 for the final changes

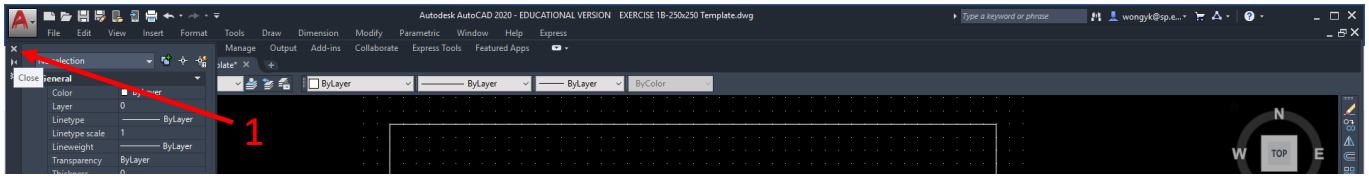

FIG 9

1. Next, click the **x** on the Change dialog box **(1)** to close the dialog box.
2. Fig 9 shows the closing of dialog box.

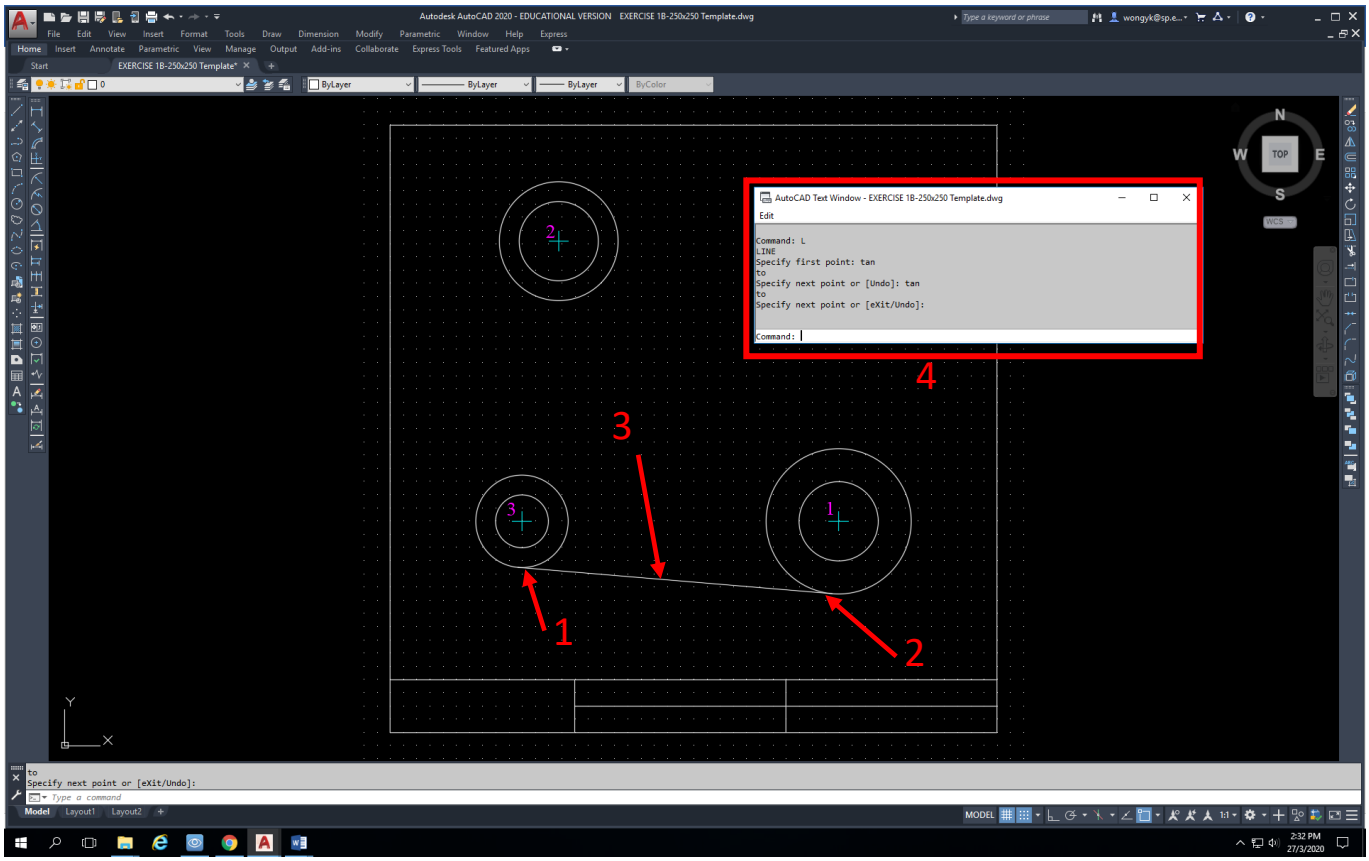

FIG 10

1. Next, draw a line tangent to set 1 & set 3 outer circles.
2. Method:
    i. Type **l** for line command
    ii. Specify first point: Type **tan** (To represent tangent) and then enter,
    iii. **Click on the outer circle of set 3** (A deferred tangent **(1)** message appear),
    iv. Specify next point: Type **tan** and then enter,
    v. Click on the outer circle of set 1….. (2)
    vi. A line **(3)** is drawn tangent to both set 1 & 3 outer circles.
    vii. See Fig 10 for the steps **(4)** to draw an line tangent to 2 circles

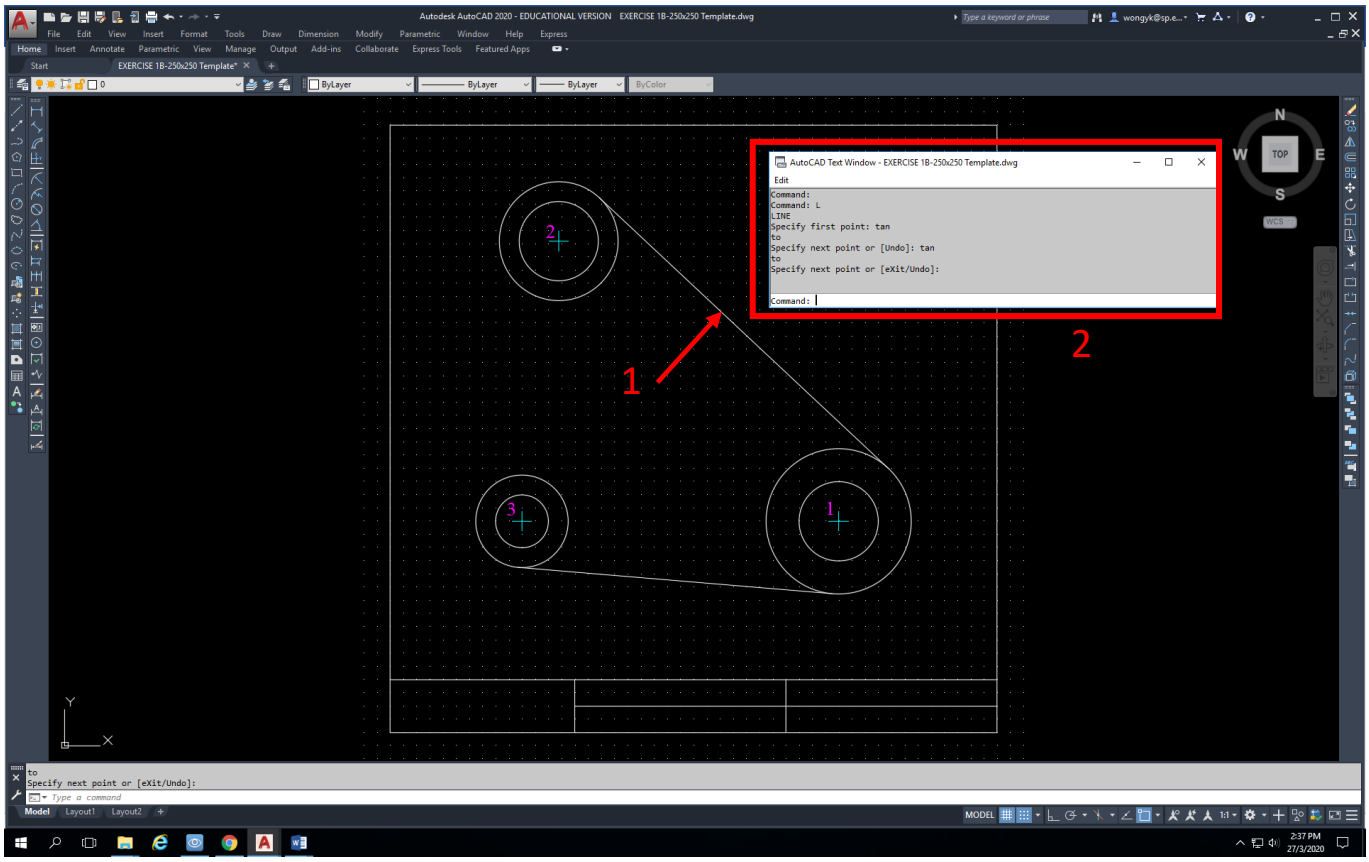

FIG 11

1. Similarly, use the same method as in Fig 10 to draw a **line (1) tangent to the set 1 & set 2 outer circles**.
2. See Fig 11 for the steps **(2)** to draw line tangent to set 1 & 2 outer circles.

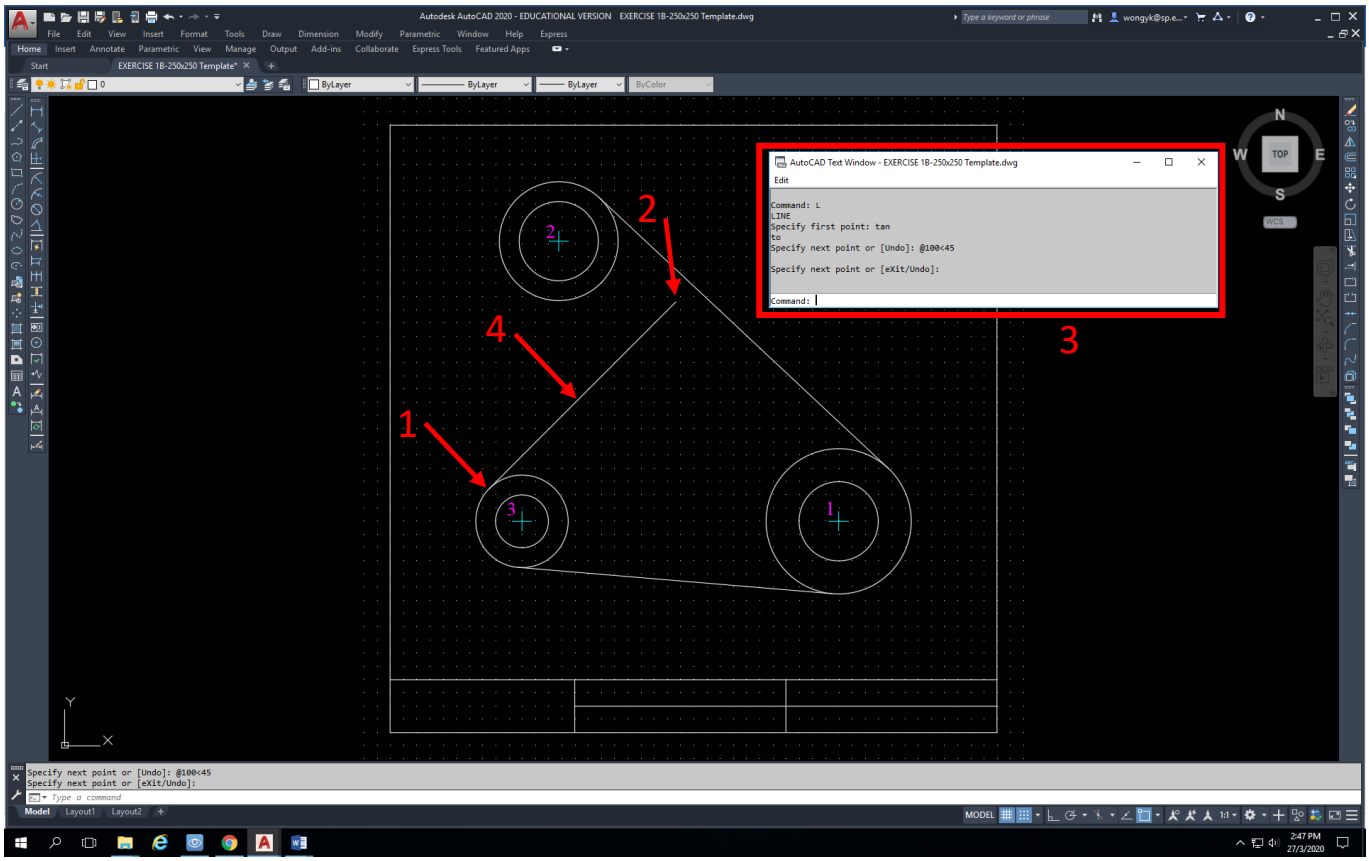

FIG 12

1. Next, draw a line tangent to set 3 outer circle at an angle 45 degrees from Horizontal towards right (zero degrees)
2. Method:
    i. Type **l** for command line keyboard shortcut
    ii. Specify first point: type **tan** (To represent tangent)
    iii. **Click on the outer circle** ..**(1)** (A deferred Tangent message appears)
    iv. Specify Next point: type **@100<45** … **(2)**and then **enter** (To represent 100 mm distance away from deferred tangent to outer circle set 3 and an angle of 45 degrees from horizontal direction towards right (zero degrees)
    v. See Fig 12 indicating the steps **(3)** and line **(4)** drawn with one end tangent to set 3 outer circle and the other end 100mm away from deferred tangent at 45 degrees.

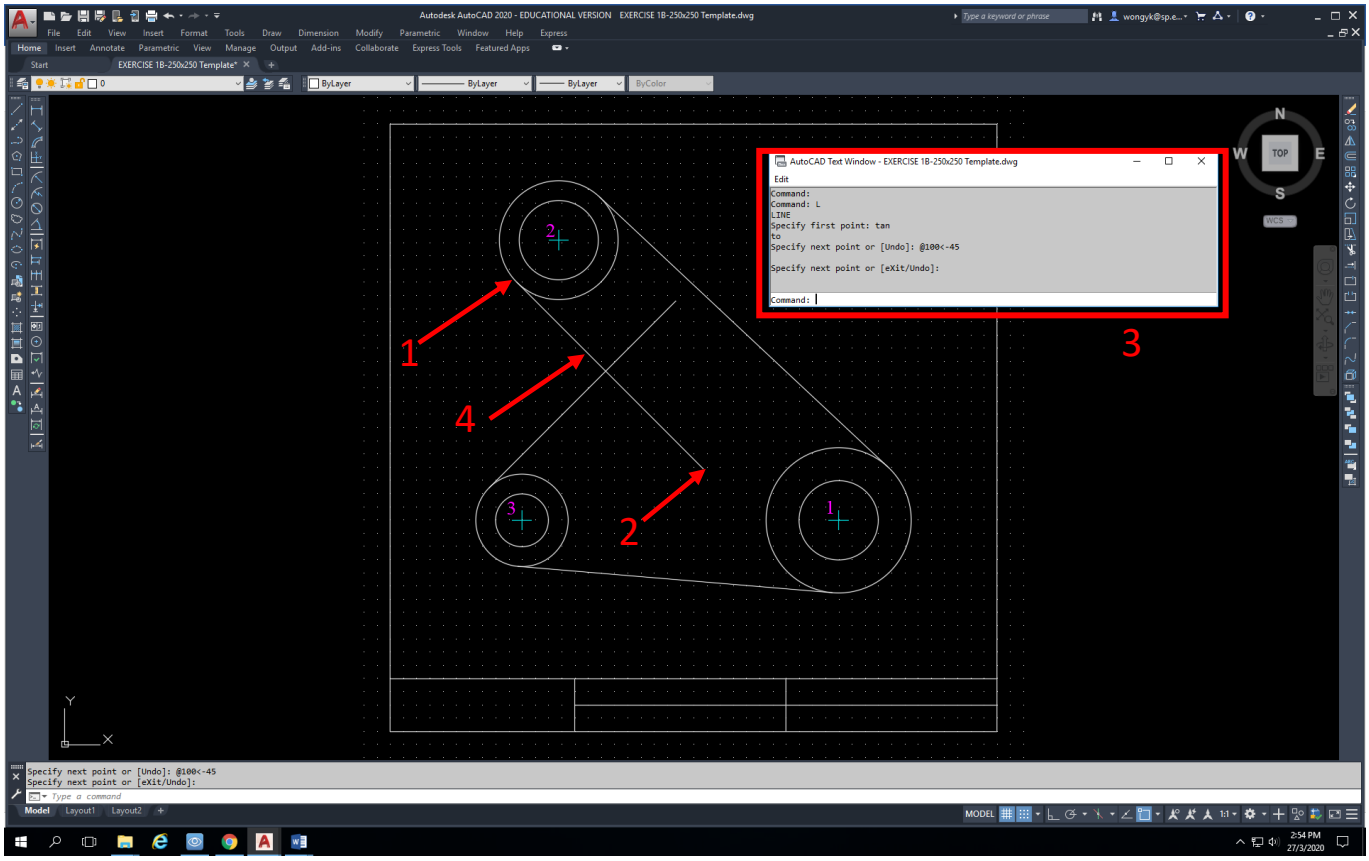

FIG 13

3. similarly, draw a line tangent to set 2 outer circle at an angle -45 degrees from Horizontal towards right (zero degrees)
4. Method:
   - vi. Type **l** for command line keyboard shortcut
   - vii. Specify first point: type **tan** (To represent tangent)
   - viii. Click on the outer circle **….(1)** (A deferred Tangent message appears)
   - ix. Specify Next point **(2)**: type **@100<-45** and then **enter** (To represent 100 mm distance away from deferred tangent to outer circle set 2 and an angle of -45 degrees from horizontal direction towards right (zero degrees)
   - x. See Fig 13 indicating the steps **(3)** and line **(4)** drawn with one end tangent to set 2 outer circle and the other end 100mm away from deferred tangent at -45 degrees.

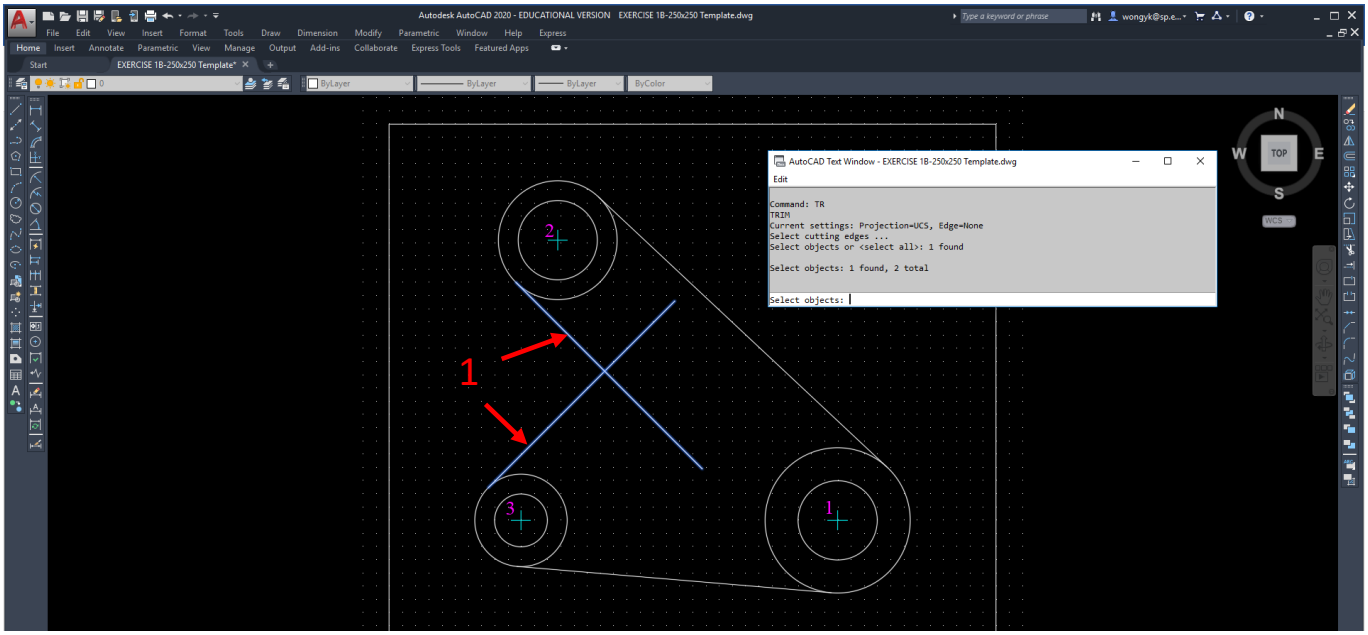

FIG 13

1. Next, Trim off the unwanted portion of the 2 intersecting lines.
2. Method:
    i. Type **tr** (Trim command keyboard shortcut)
    ii. **Click on the 2 intersecting lines** …**(1)** and then **enter** (see Fig 13)

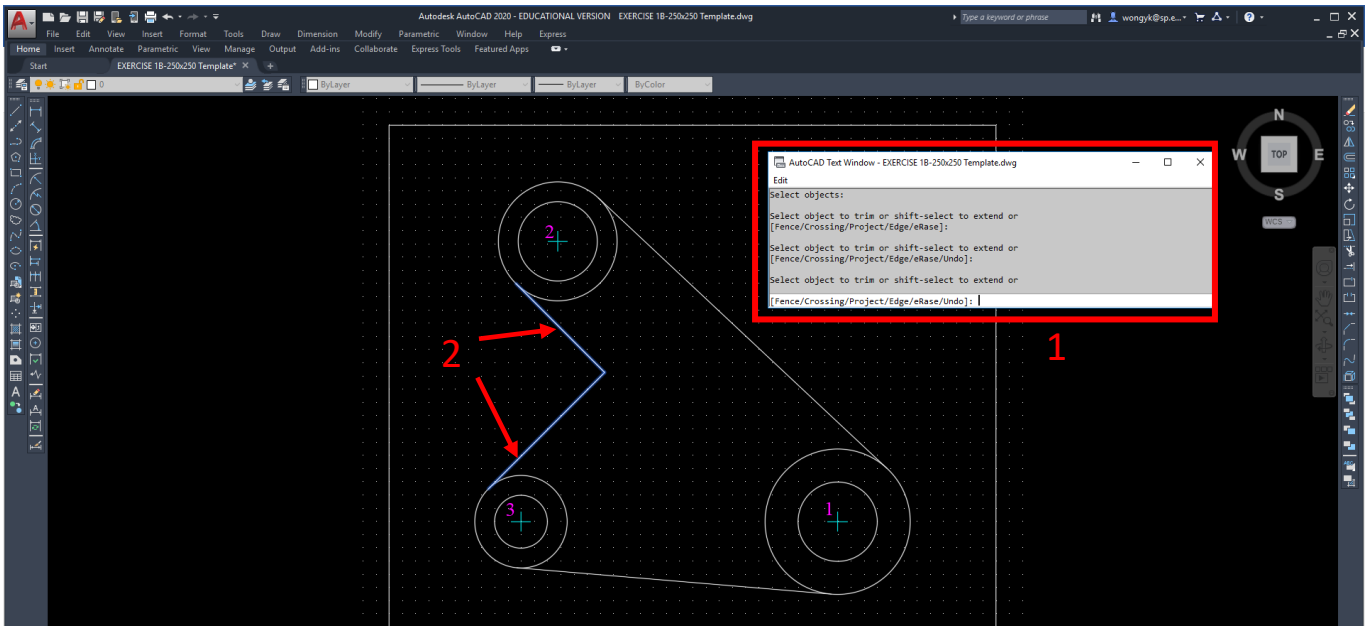

FIG 14

iii. Select object to trim, move mouse to **click on the unwanted portion of the 2 intersecting lines**, then **enter**
iv. See Fig 14 for steps **(1)** and trimmed lines **(2)**

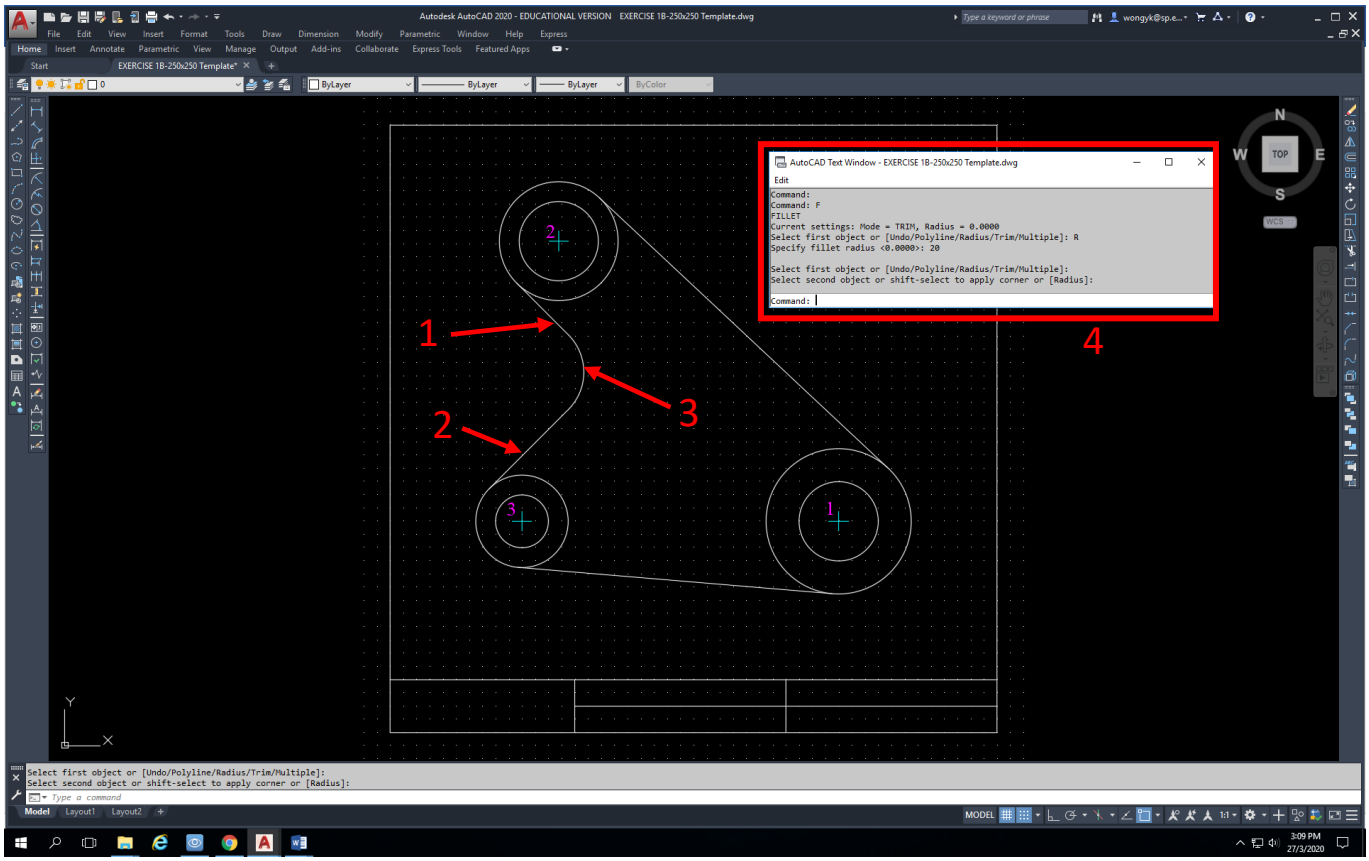

FIG 15

1. Next, use Command Fillet to round the intersecting lines to a radius of curvature = 20mm
2. Method:
    i. Type **f** (Keyboard shortcut to fillet)
    ii. Click **Radius** at the command line
    iii. Specify Fillet radius, Type radius =**20**
    iv. Select first object, **Click on one line ….(1)**
    v. Select second object, **Click on the other intersecting line ….(2)**
    vi. See Fig 15: Fillet with a radius of curvature 20mm **(3)** complete with steps attached **(4)**

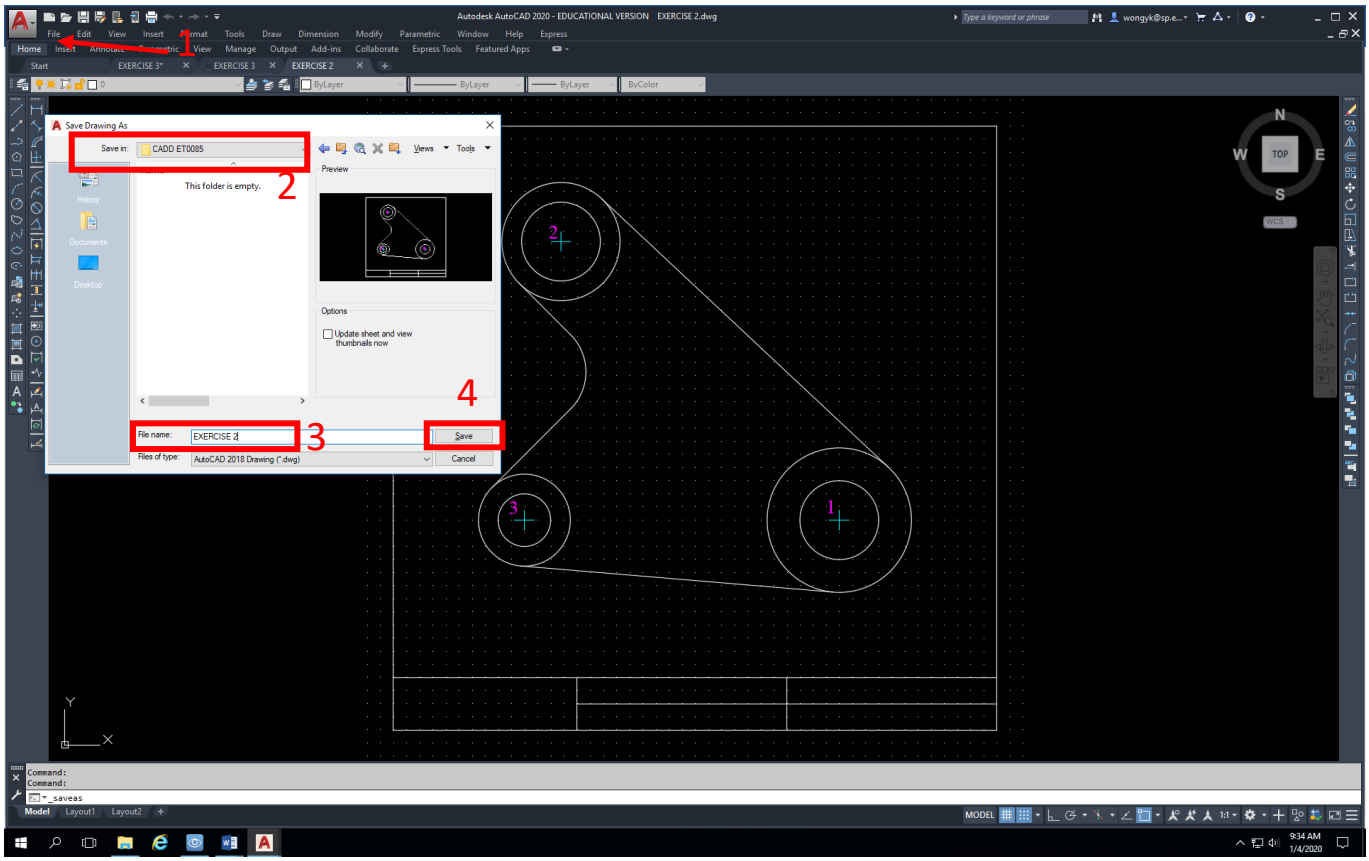

FIG 16

1. Save this drawing as shown in Fig 16:
   i. Click **File ….(1)**
   ii. Click **Saveas** (From pull down menu)
   iii. Save in **(2): D Drive in your Notebook, create a folder= CADD ET0085 … (2)** instead of default "Documents"
   iv. File Name **(3): EXERCISE 2,** then click **Save .. (4)**
   v. See Fig 16 indicating steps to save accordingly.

THE END