EXERCISE 4 GUIDED SOLUTION

To draw the object in Exercise 4 (BB→Learning Resources→LAB→ UNIT 6 -Pg 139 & Pg 140)

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:

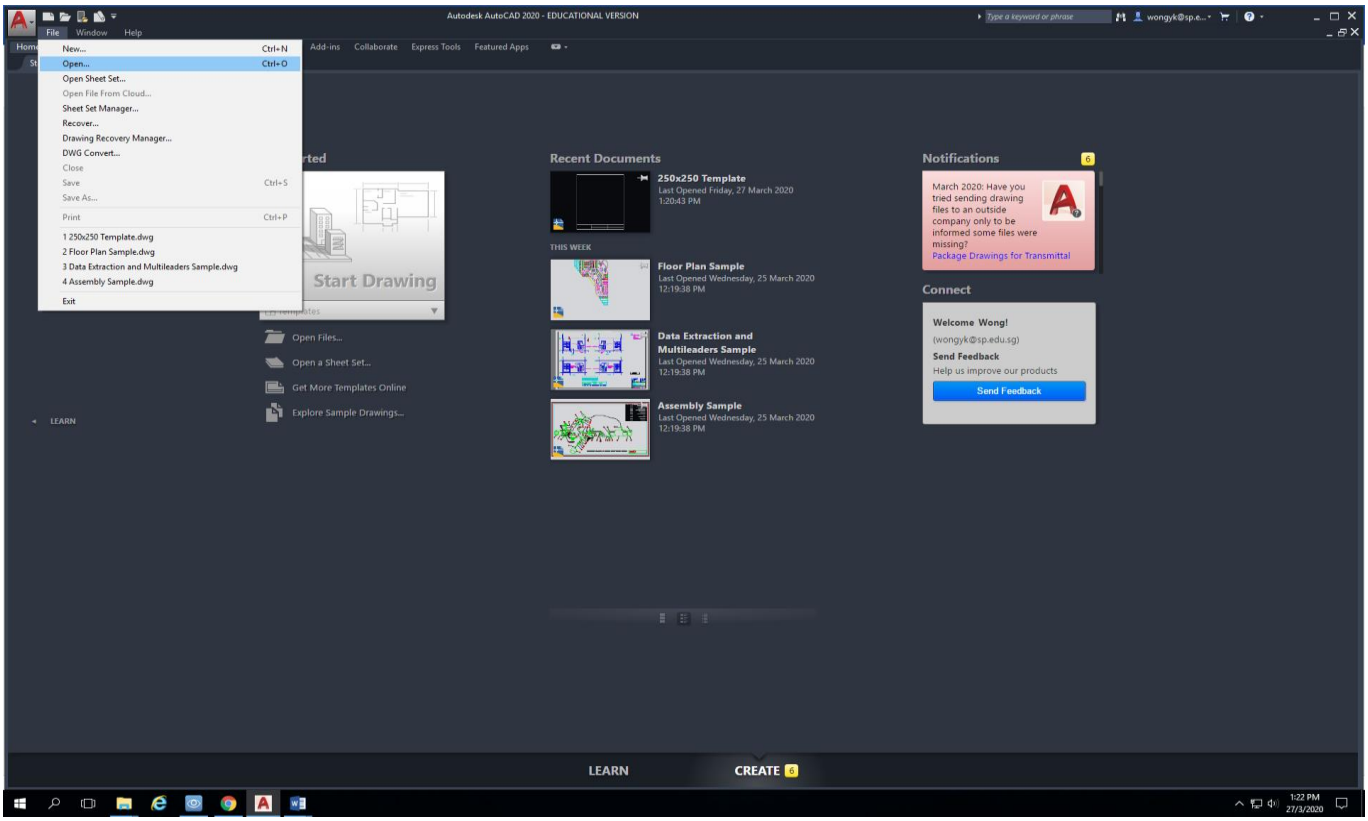

FIG 1

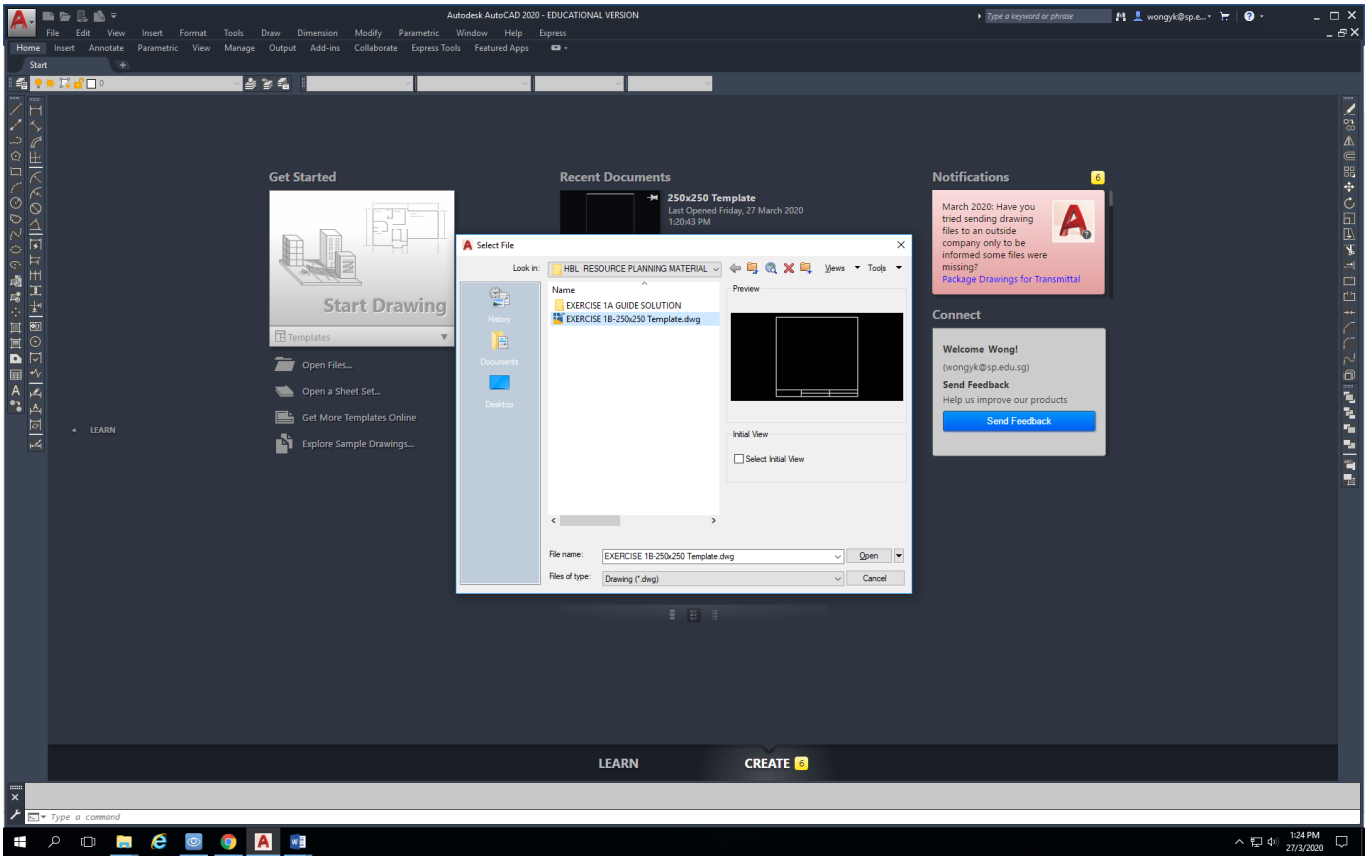

FIG 2

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

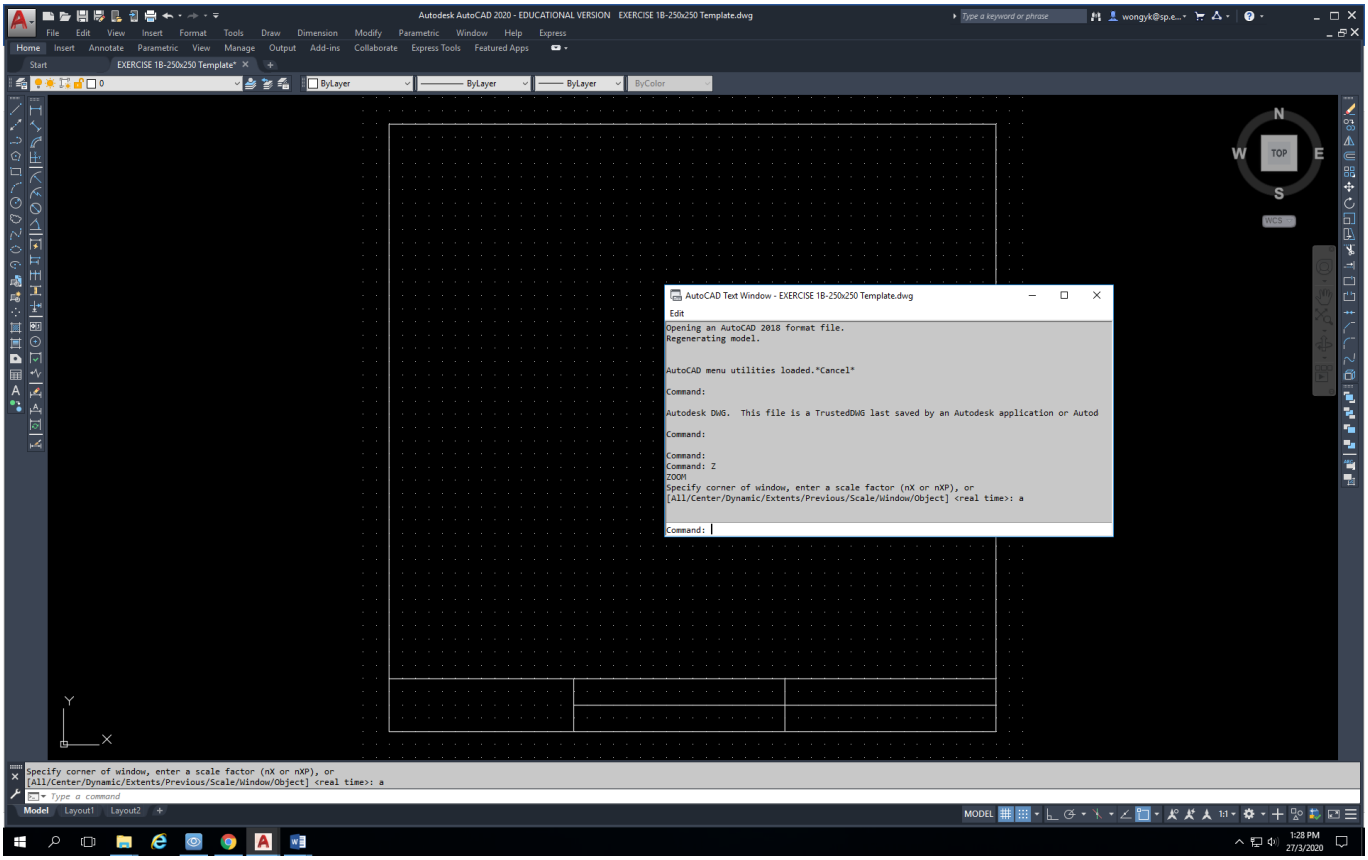

FIG 3

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 4

After completed the 8 settings and positioned all 6 frequently used toolbars, it's now ready to start drawing Exercise 4 object.

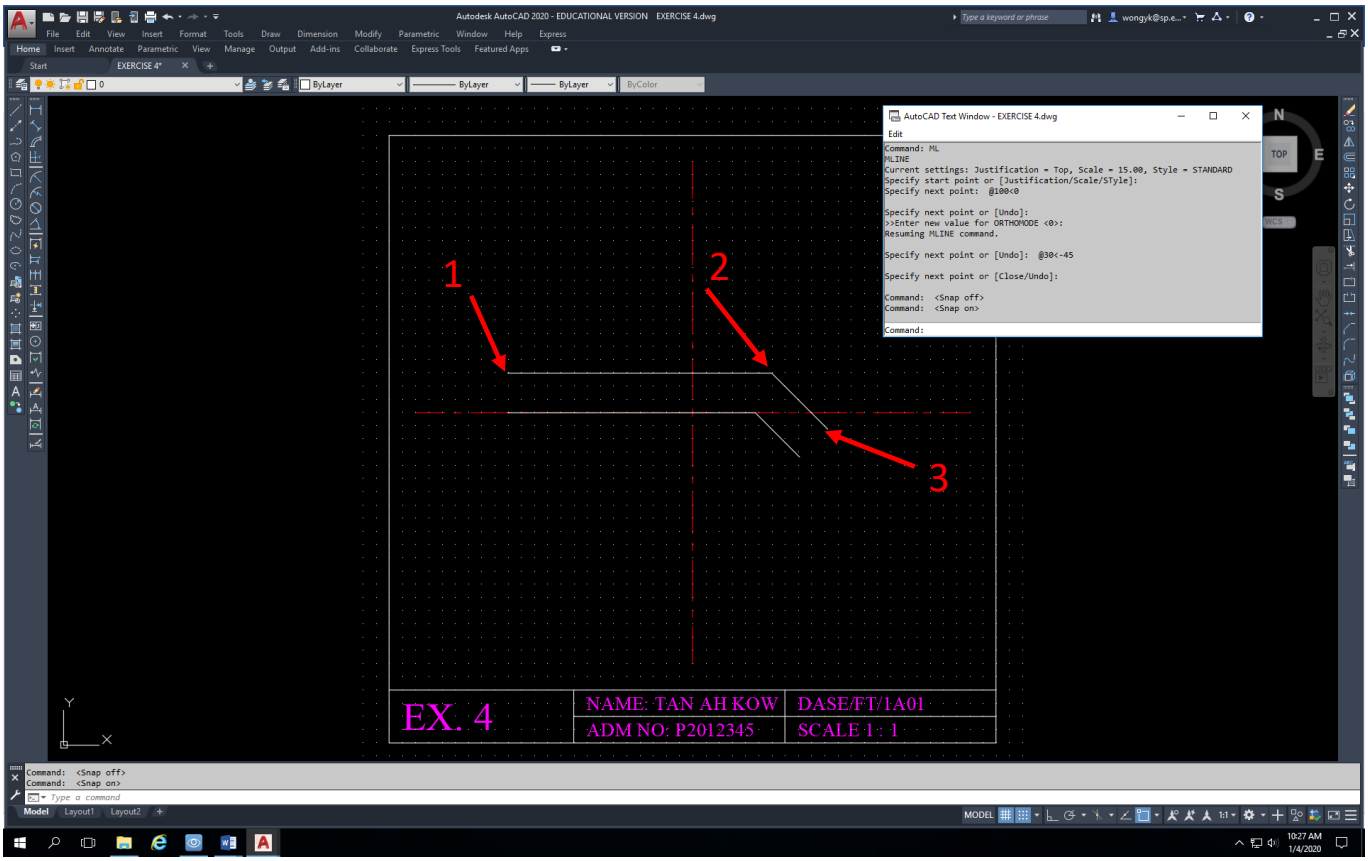

FIG 4

Method:

i. Type: **ml** (To draw a multi-line with default spacing of 15mm apart. If spacing is not 15mm default, say 20mm, then click Scale and type: 20)

ii. Specify start point = Click a point at position **(1)**

iii. Specify next point, type= **@100<0** [To draw a multi-line 100mm away from start point at angle 0 degrees, i.e. in direction left to right at position **(2)**]

iv. Continue or resume Multi-line drawing

v. Specify next point, type = **@30<-45** [To continue drawing multi-line 30mm away from position (2) at an angle -45 degrees from horizontal as shown in position **(3).**

vi. Then press **enter** to complete the command.

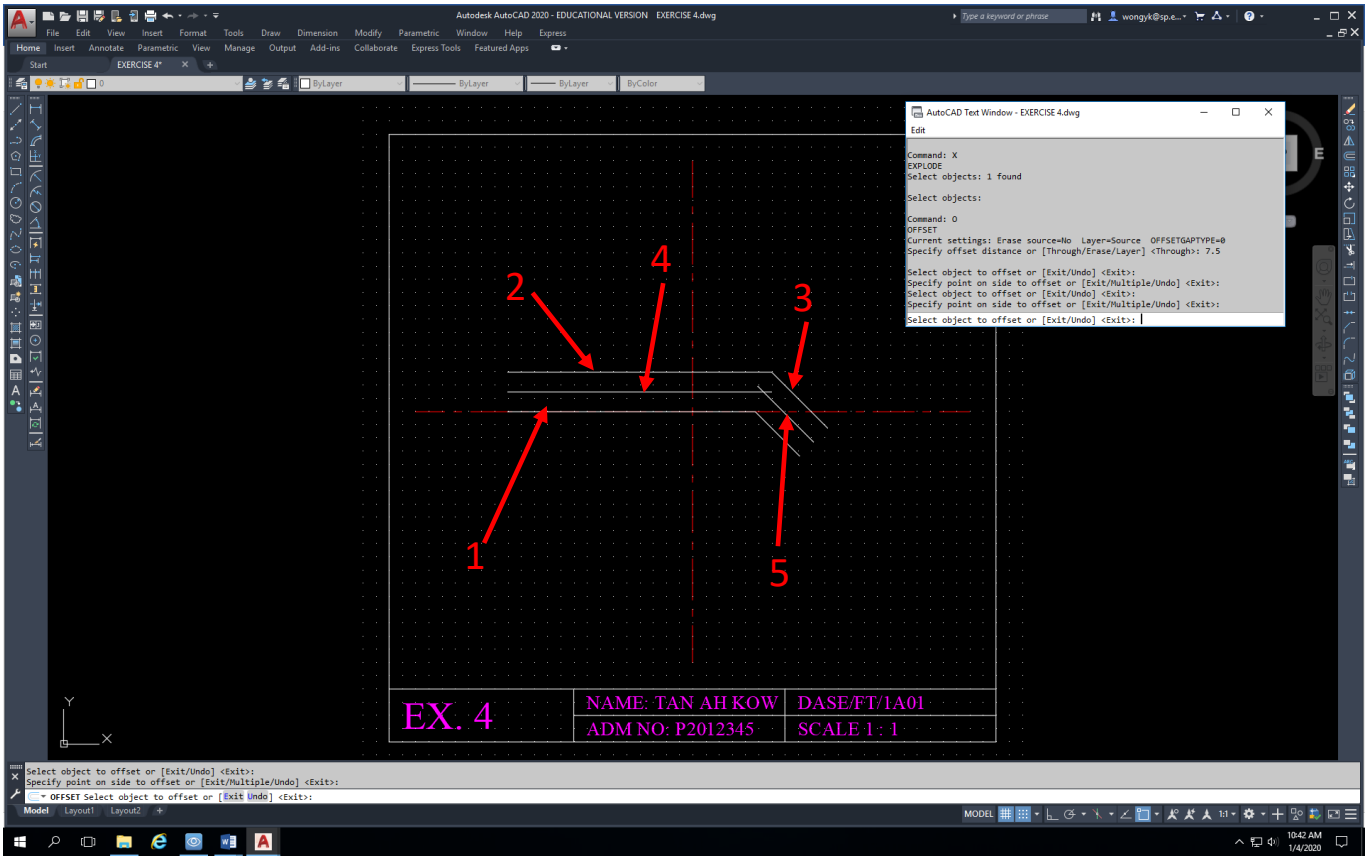

FIG 5

vii. Type = x (To explode Multi-line (1) as it's a polyline representing 1 entity or object)

viii. Type = o (To offset lines (2) & (3) to middle)

ix. Offset distance, type = 7.5 (As the multi-line is 15mm apart)

x. Select object to offset, click line (2) and then click anywhere below line (2). An offset line (4) is created.

xi. Similarly, click line (3) and then click anywhere below line (3), an offset line (5) is created.

Fig 5 shown the created offset lines (4) & (5)

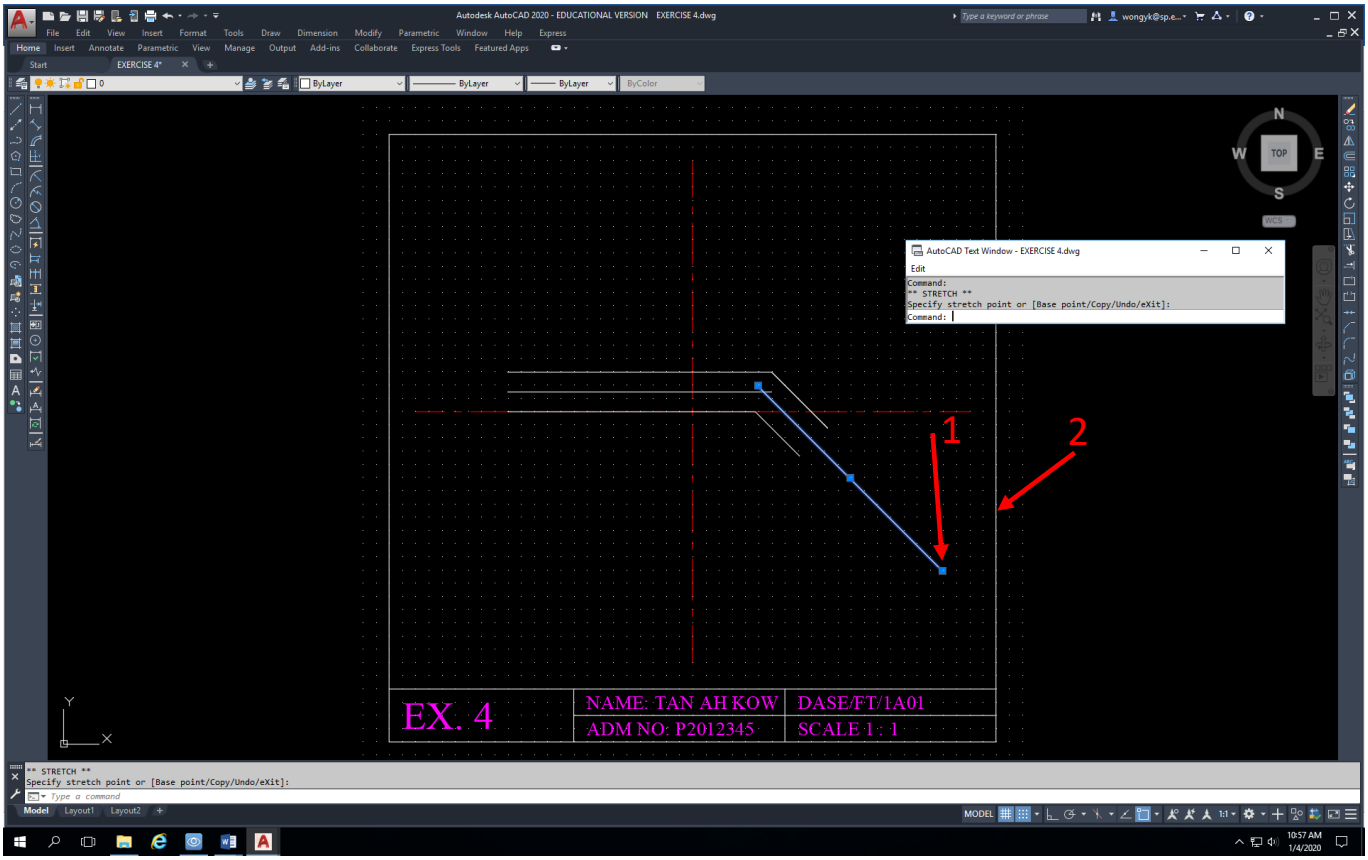

FIG 6

xii. Click on line (5) of Fig 5, a blue line with 3 blue squares appear as seen in Fig 6

xiii. Click on **bottom blue square** point **(1),** it turns **red square**.

xiv. Next, stretch it down in a direction -45 degrees or 315 degrees.

xv. And click at a certain distance near towards border **(2)** as shown in Fig 6.

xvi. Press **Esc** (Top left key in keyboard)

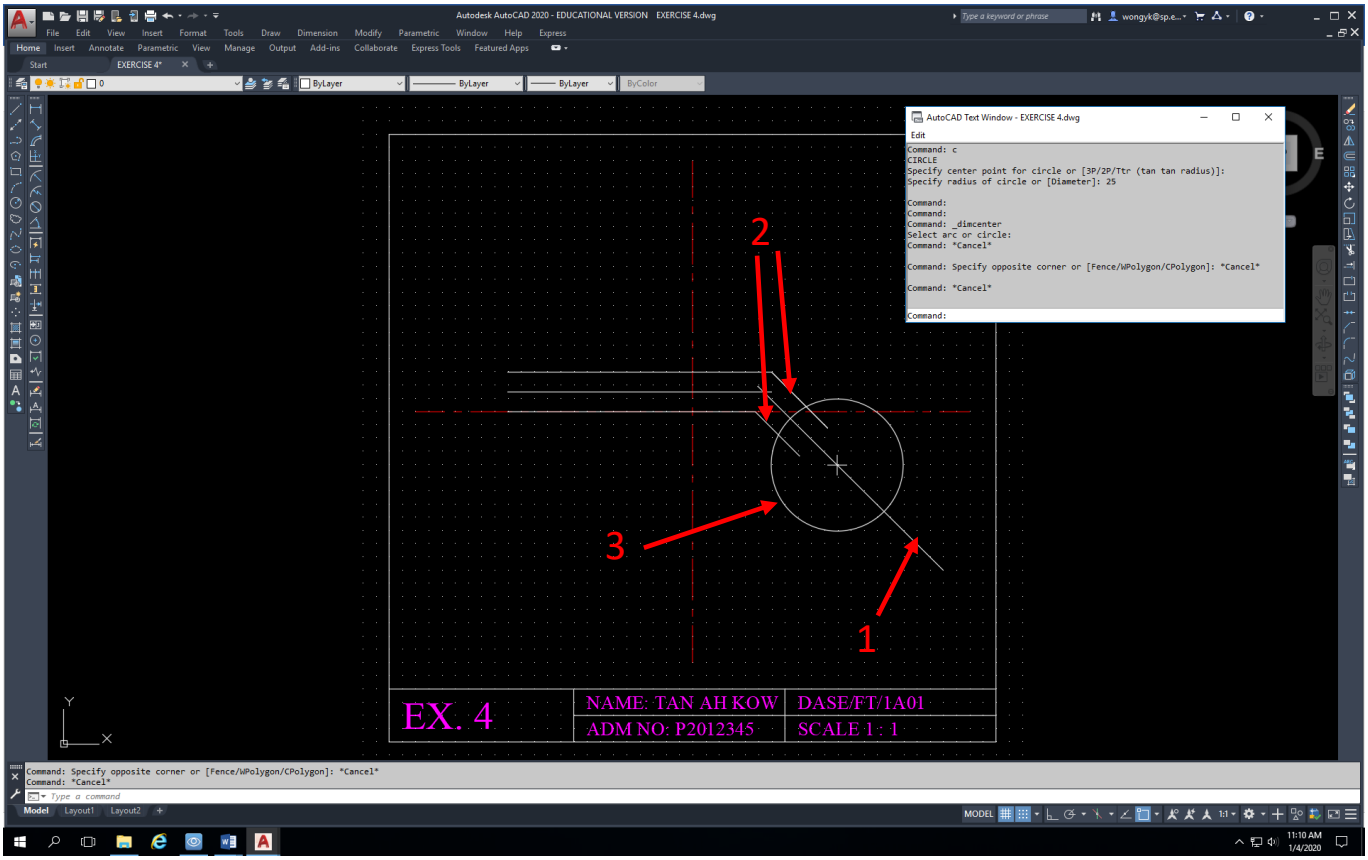

FIG 7

xvii. Type = c (To draw a circle)

xviii. Specify centre point for circle, **click point (1)** (Centre at line (1) and position centre at about 10mm away from the two -45 degrees lines **(2).**

xix. Specify Radius of circle, type = **25** (Given diameter is 50mm)

xx. Then press **enter**.

xxi. A circle (3) is drawn cutting the 2 lines at -45 degrees as shown in Fig 7.

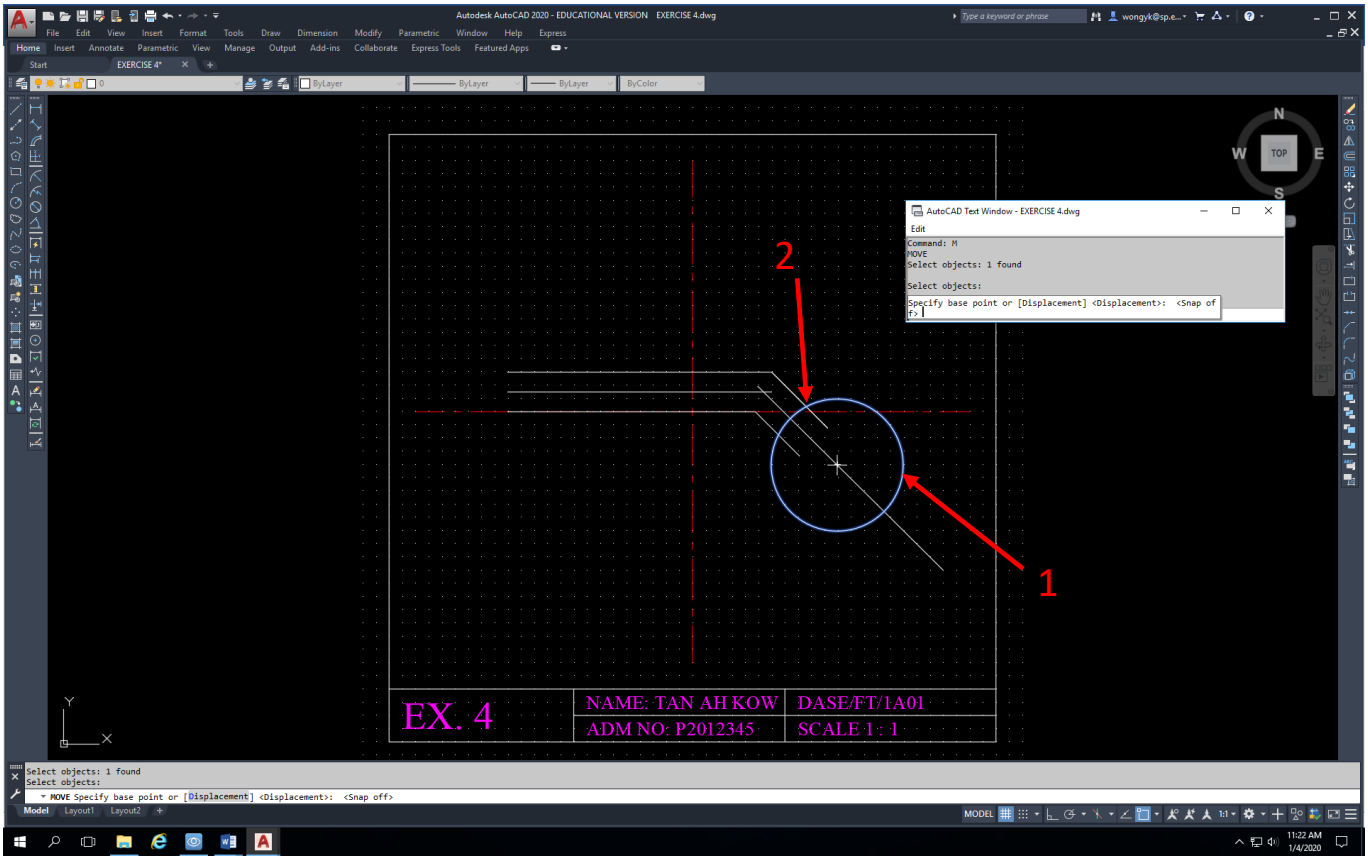

FIG 8

xxii. Next, type = m (To move the circle to end of -45 degrees upper line)

xxiii. Select object = Click on the circle (1)

xxiv. Specify base point = click at point (2)

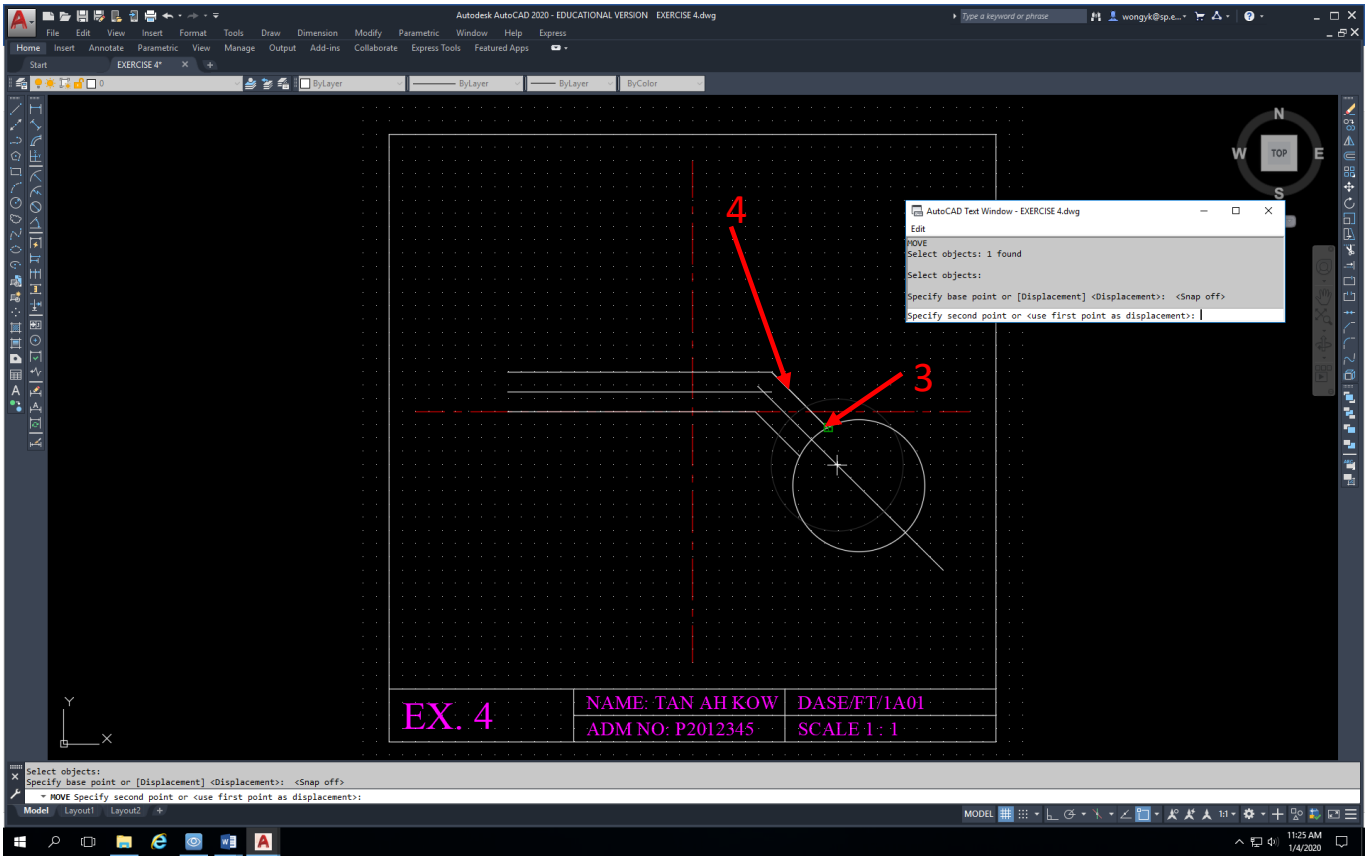

FIG 9

xxv. Move cursor to point (3) and click at the point (The end point of -45 degrees upper line (4)

xxvi. Fig 9 shows the circle position after moving to endpoint of line (4)

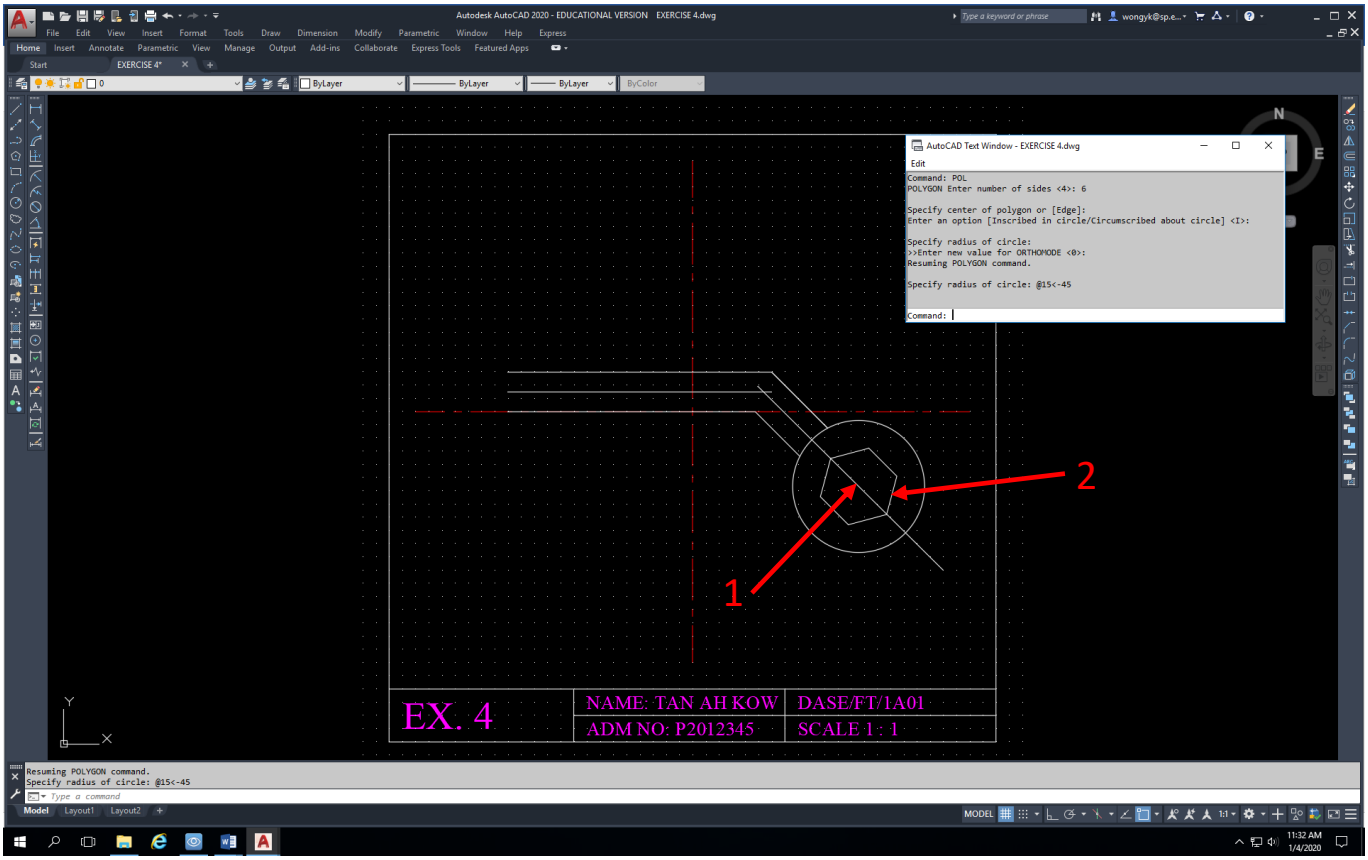

FIG 10

xxvii. Type = **pol** (To draw polygon of inscribed radius 15mm at centre of circle)

xxviii. Number of sides, type = **6**

xxix. Specify centre of polygon **(1)** = **click the centre of the circle**

xxx. Enter an option = **Click Inscribed in circle**

xxxi. Specify radius of circle, type = **@15<-45** (Inscribed Polygon **(2)** of radius 15mm at an angle of -45 degrees)

xxxii. 6 sided polygon or Hexagon is drawn accurately with specific direction as shown in Fig 10.

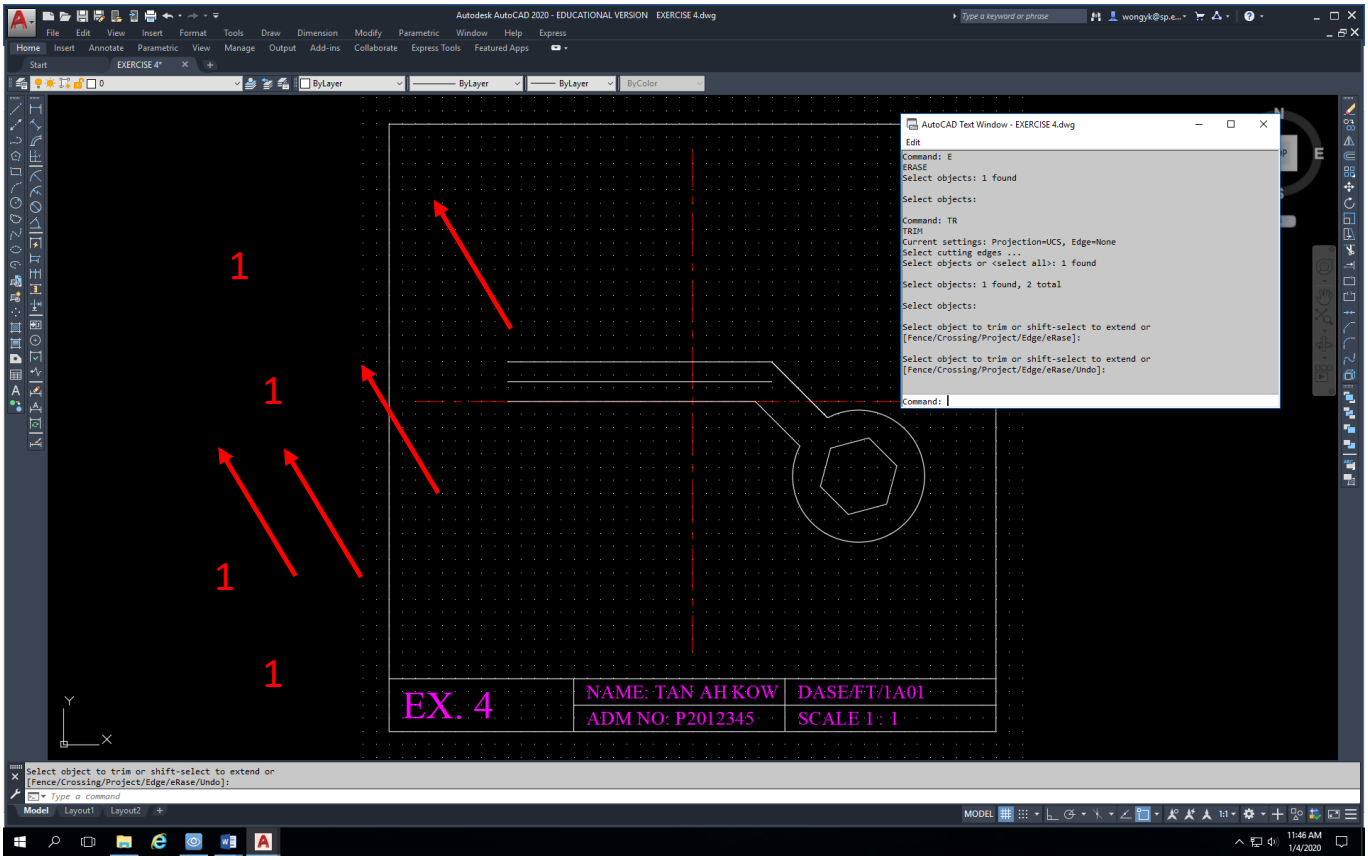

FIG 11

xxxiii. Erase, type = **e**

xxxiv. Select object = **click on the line passing through the centre of circle**

xxxv. Press = **enter** (To complete erasing the selected line)

xxxvi. Next, Trim, type = **tr** (To trim off the portion of circle in between the -45 degress lines)

xxxvii. You should know the steps for trimming by now, if not refer to video of BB notes)

xxxviii. Fig 11 shows the diagram after erase and trim.

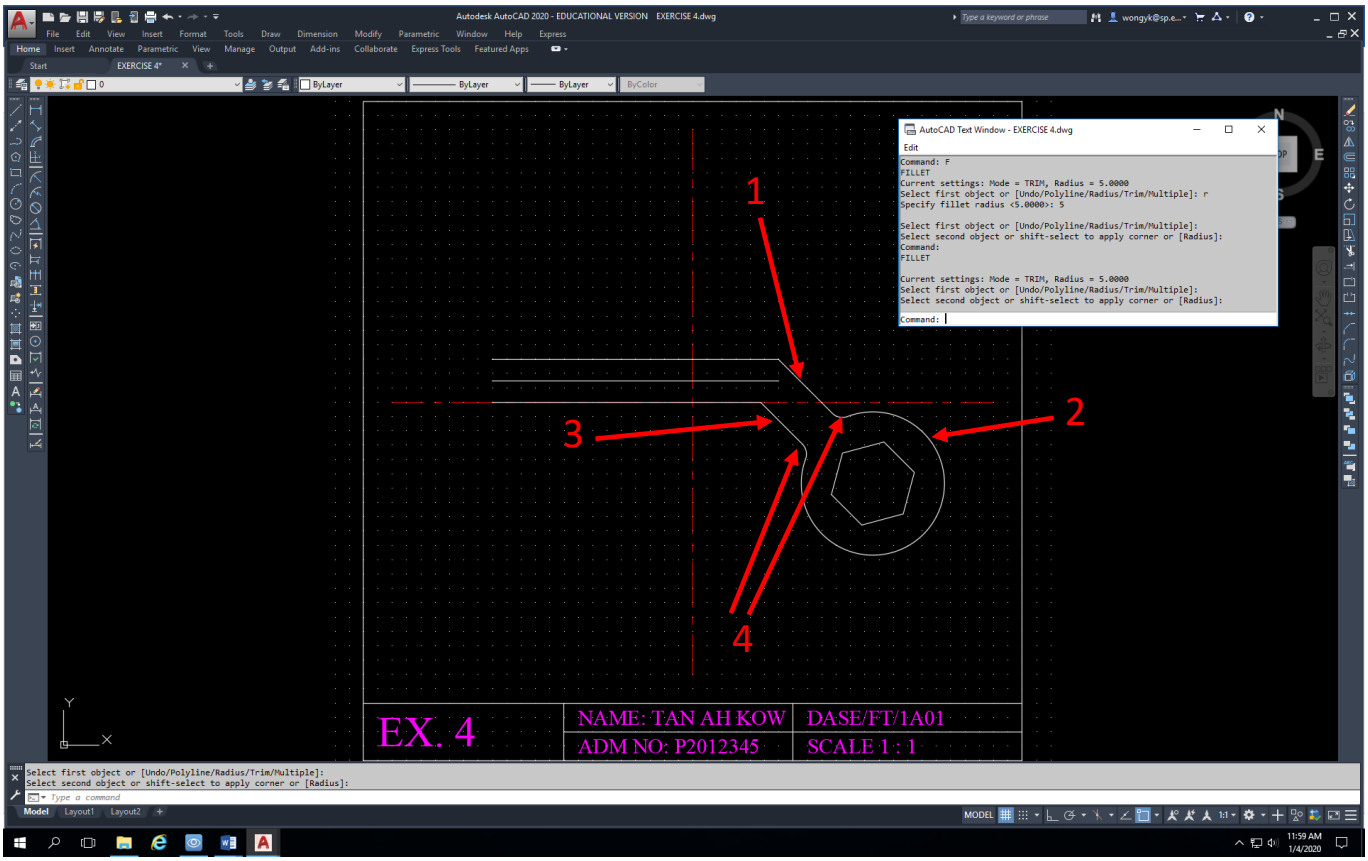

FIG 12

xxxix. Next, fillet the intersection between circle and 2 lines.

xl. Type = **f** (keyboard shortcut for fillet)

xli. Click Radius, type = **5** (To change fillet radius of curvature to 5mm)

xlii. Select first object = **click on line (1)**

xliii. Select second object = click on circle **(2)**

xliv. Similarly, do the fillet between **line (3)** and **circle (2)**

xlv. Fig 12 shows two fillets as seen in **(4)**

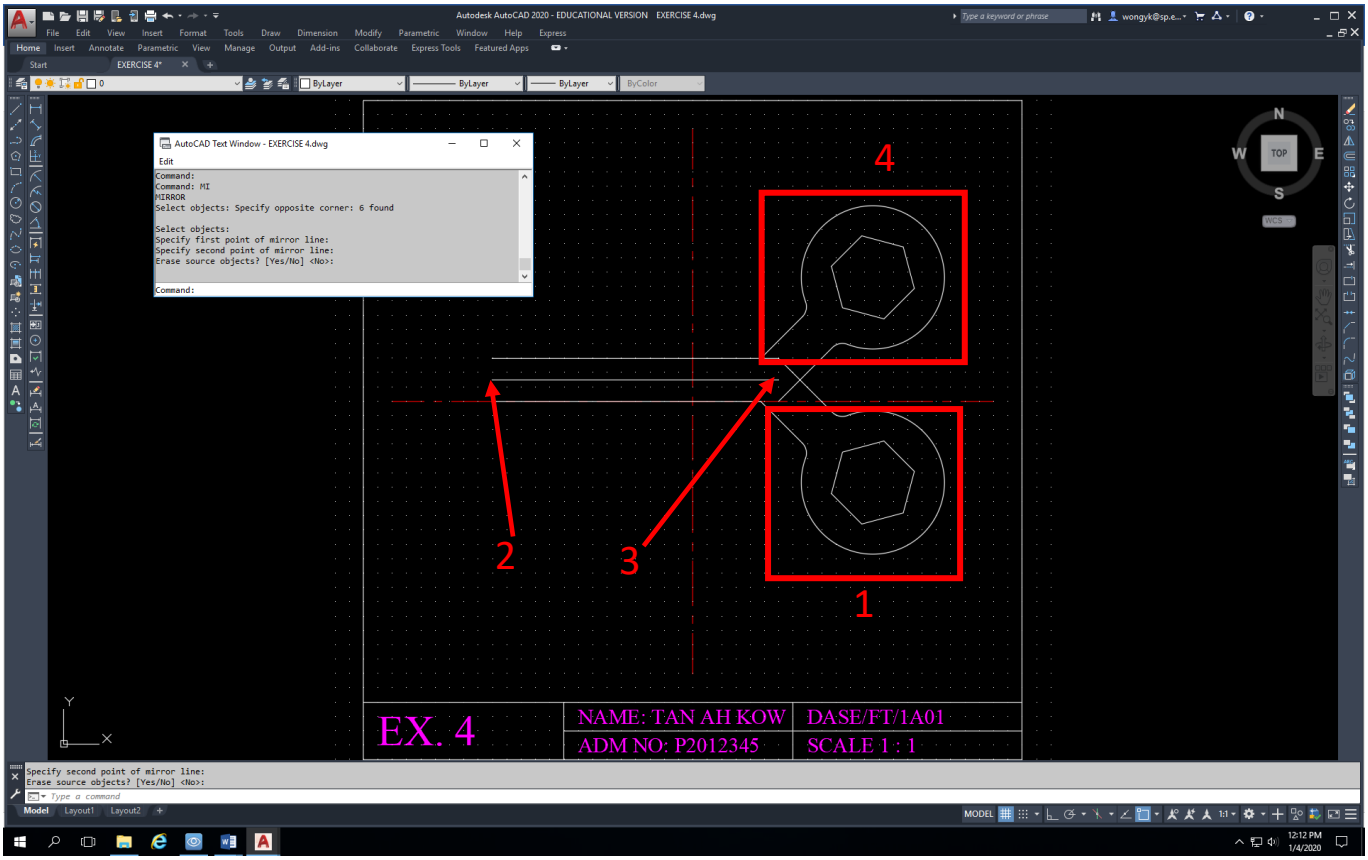

FIG 13

xlvi. Next, mirror the **object (1)**

xlvii. Type = **mi** (Keyboard shortcut for mirror)

xlviii. Select all the **object (1),** then press **enter**

xlix. Specify first point of mirror line = **click point (2)**

l. Specify second mirror point = **click point (3)**

li. Erase source object = **No**

lii. Fig 13 shows a mirrored **object (4)**

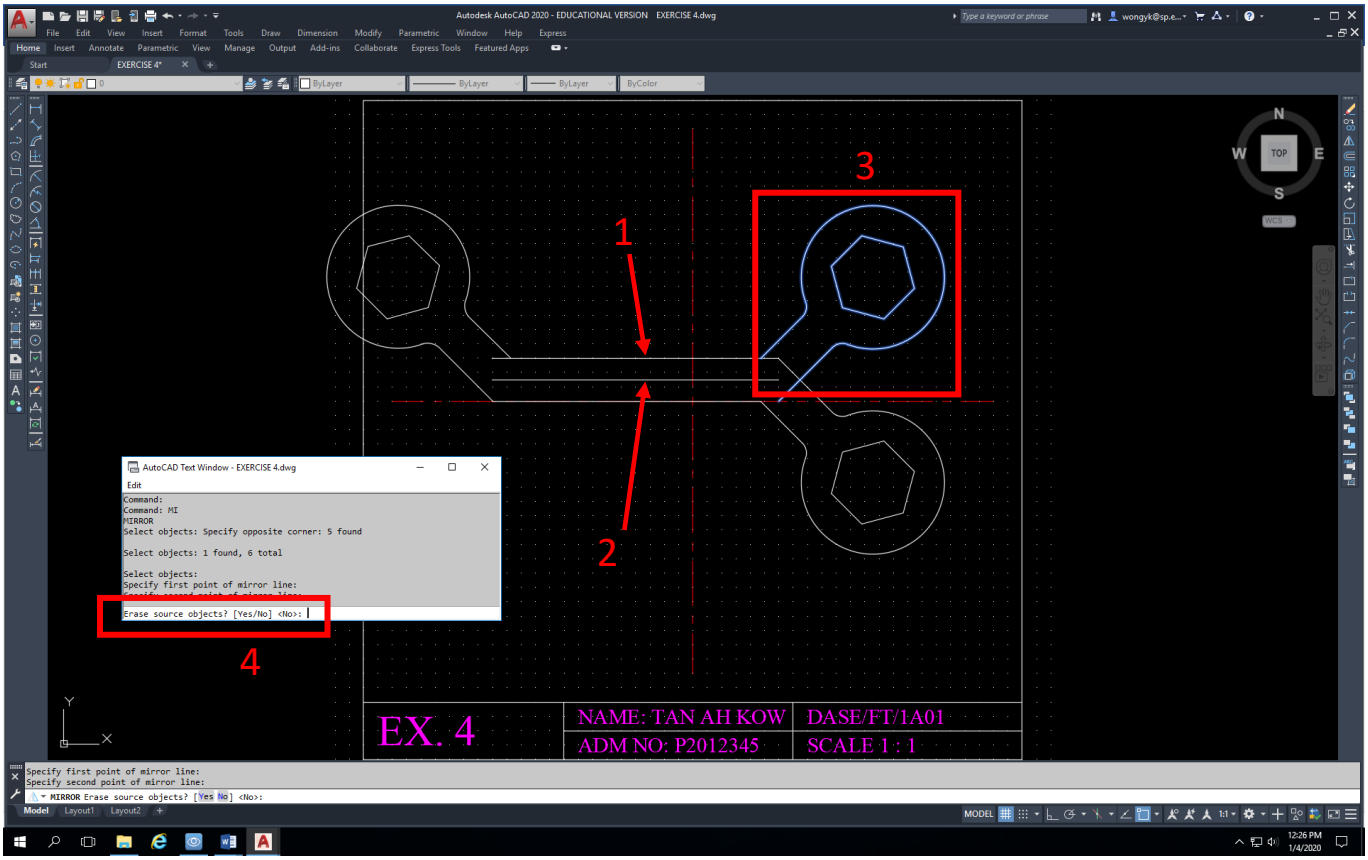

FIG 14

Next, mirror the object highlighted in blue with mirror line selecting midpoint at **line (1)** and midpoint at **Line (2)** shown in Fig 14

liii. Type = **mi**
liv. Select object = **Click the whole of object (3),** then press **enter**
lv. Select first point of mirror line = **select line (1) midpoint**
lvi. Select second point of mirror line = **Select Line (2) midpoint.**
lvii. Erase source object **(4)** = **click Yes** (To remove source object)

lviii. The diagram is shown in Fig 15 with the mirrored object (1)

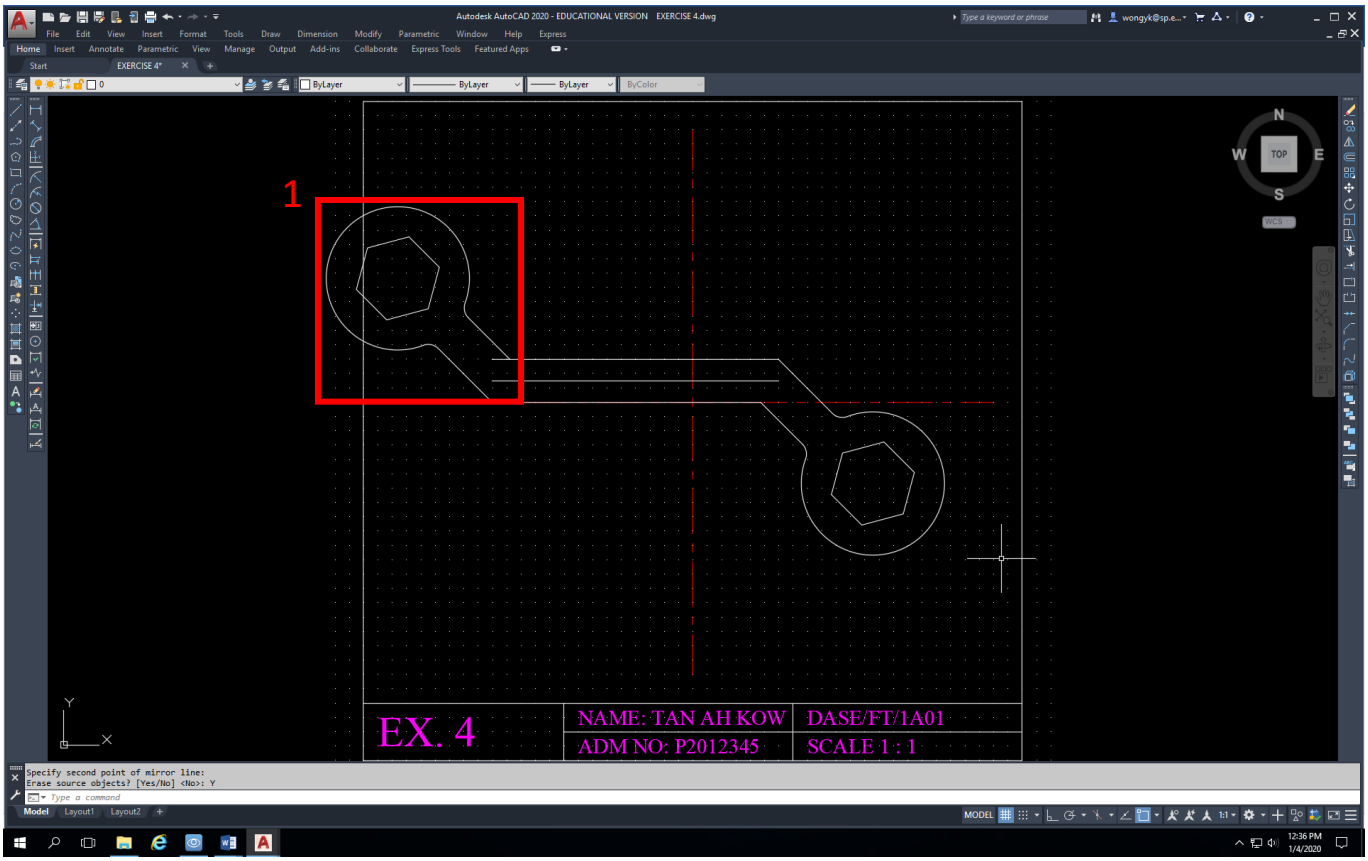

FIG 15

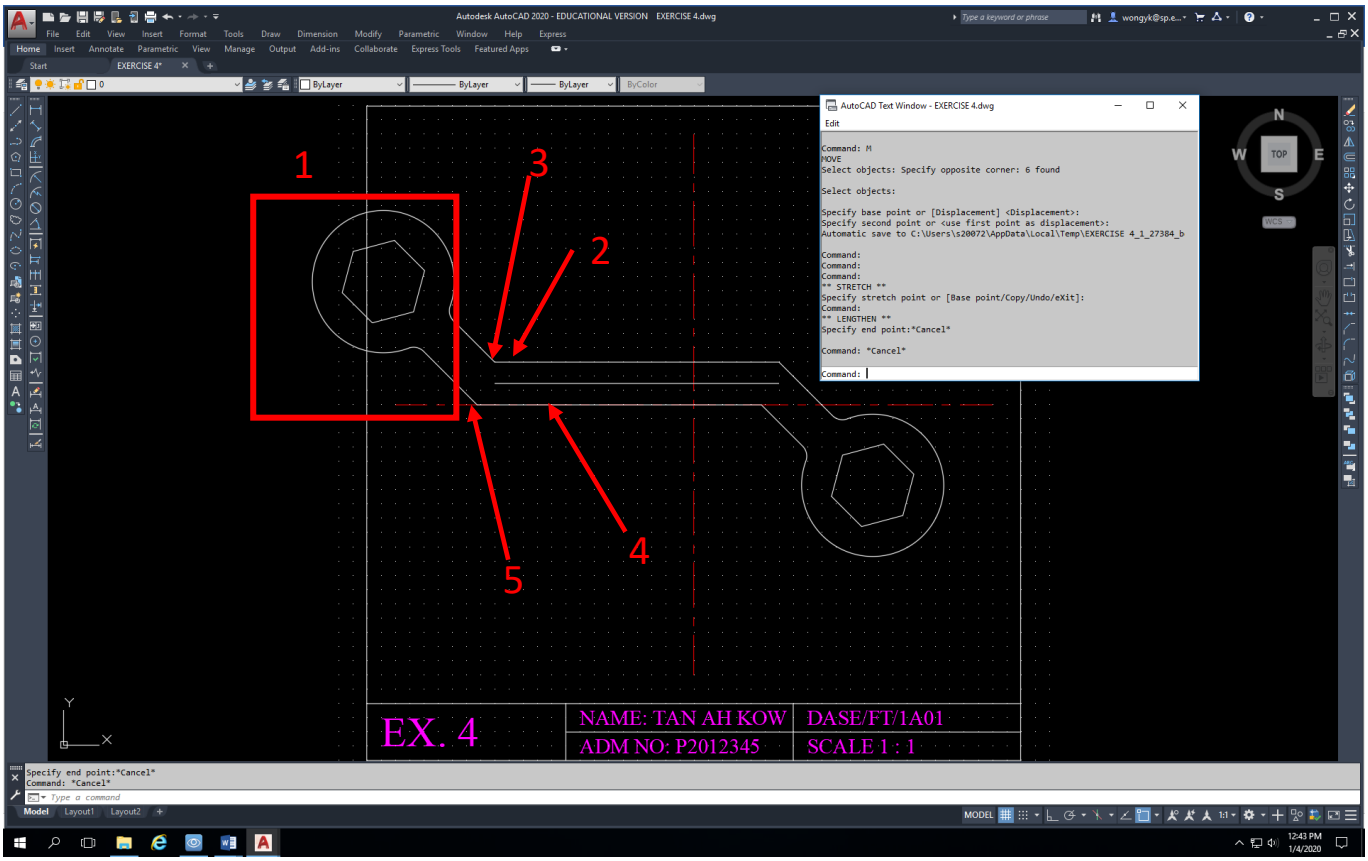

FIG 16

lix. Next, move **object (1)** from **point (2)** to line endpoint **(3)**

lx. Type = **m** (Keyboard shortcut for move)

lxi. Select object = **Click the whole of object (1)**

lxii. Specify base point = **Click at original point (2)**

lxiii. Second point = **Click at line endpoint (3)**

lxiv. Next, stretch line (4) to the endpoint **(5)**

lxv. Click on line (4), then click at left endpoint blue square, it turns red,

lxvi. Then stretch it join the bottom line slope by clicking at point **(5)**

lxvii. Fig 16 shows both mirrored object and stretched line commands

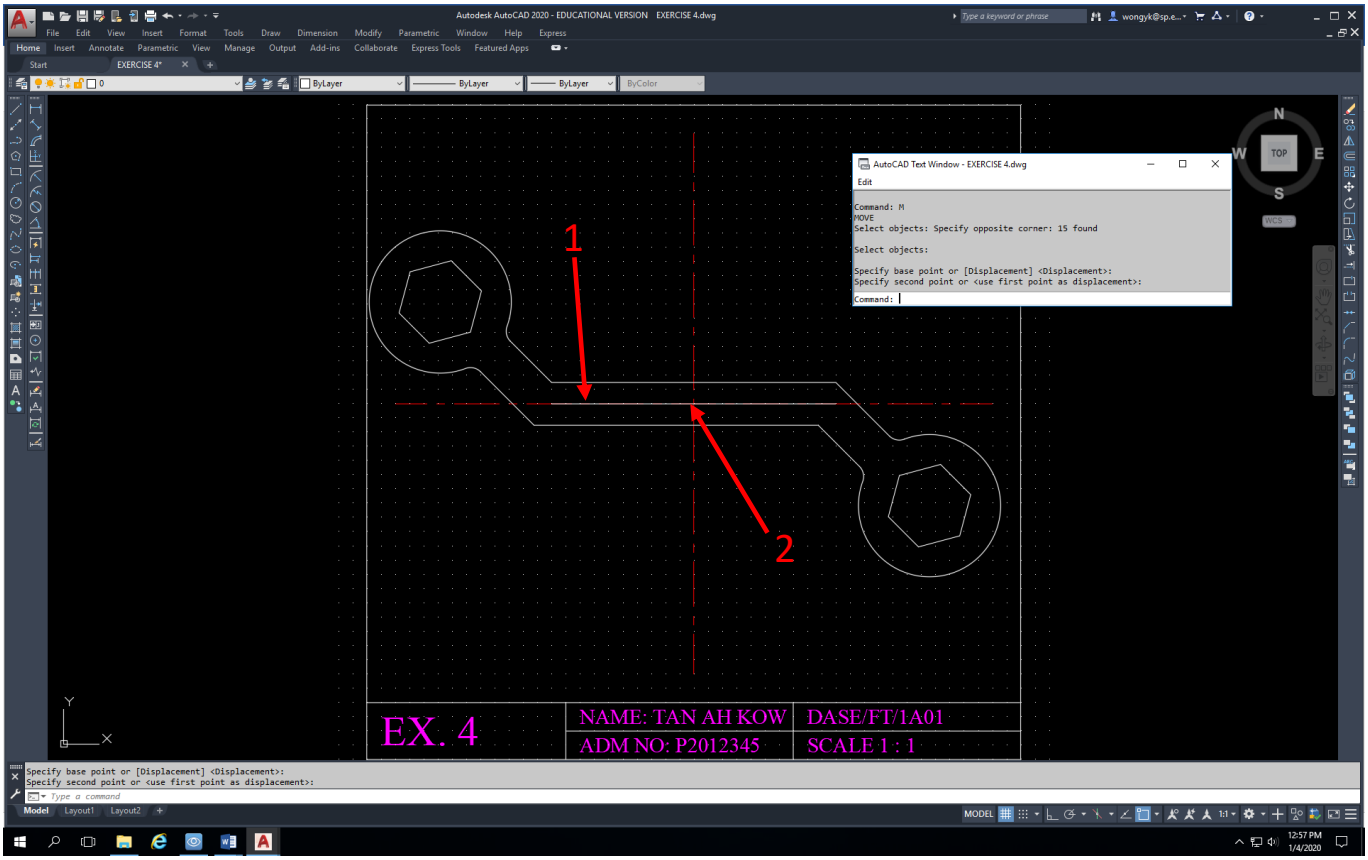

FIG 17

Next, move whole spanner object to the intersection of centre lines.

lxviii. Type = **m** (Move shortcut)

lxix. Window the whole spanner object, it turns blue

lxx. Select base point = **click at the line (1) midpoint**

lxxi. Move the whole object and drop it at the centre lines intersection by **clicking at point (2)**

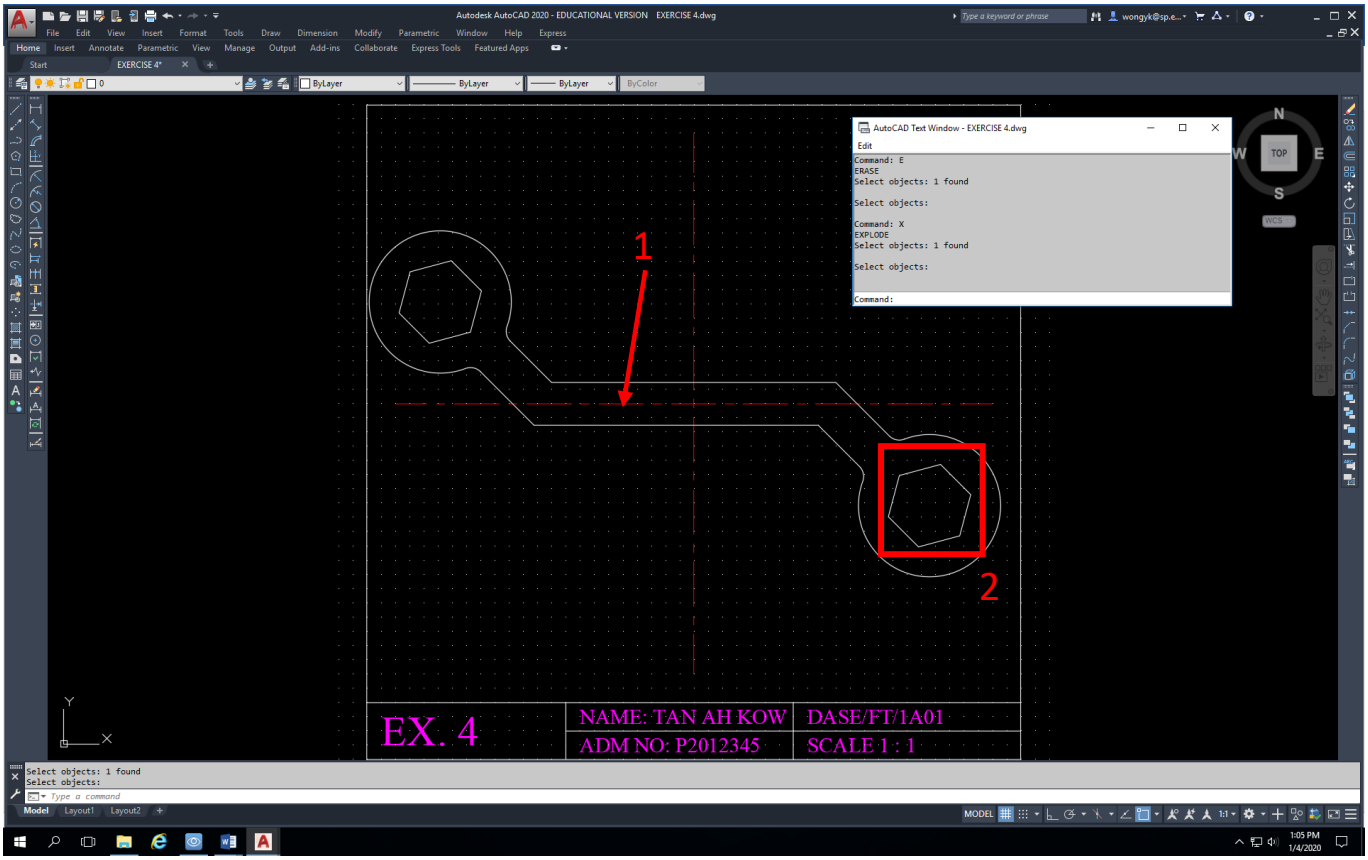

FIG 18

lxxii. Erase the middle line (1), type **= e**, click on **line (1)** and then enter. Line (1) will be erased.

lxxiii. Explode **polygon (2)** as polygon is a polyline,. i.e. 1 entity

lxxiv. Type **= x**, select object = **click on polygon (2)**, then press **enter** .

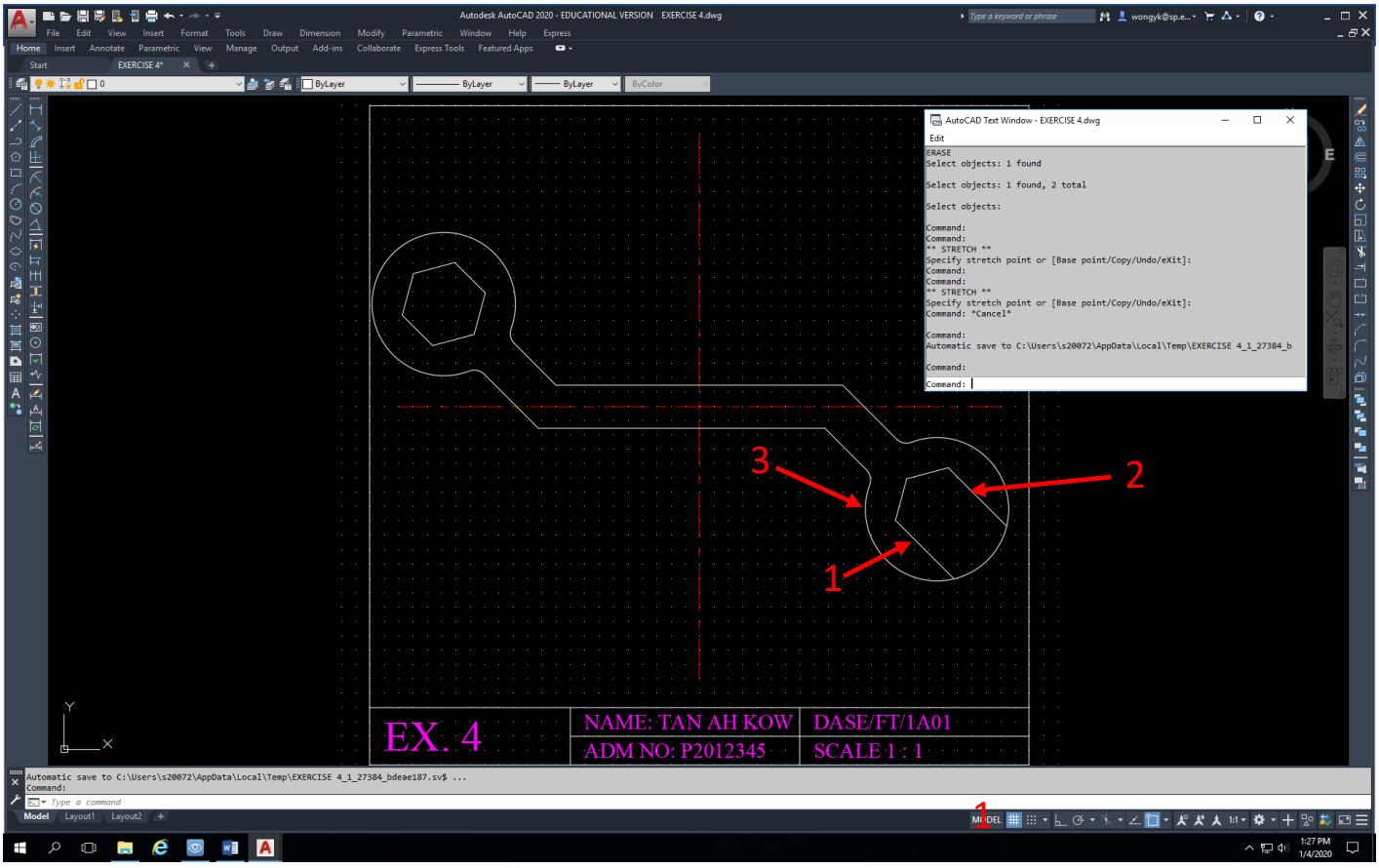

FIG 19

lxxv. Next, erase 2 lines from polygon, type = **e**, select object = **click on the two unwanted lines**, then press **enter**.

lxxvi. Use **command Stretch to extend the 2 lines (1) & (2) to the circle (3)** as shown in Fig 19.

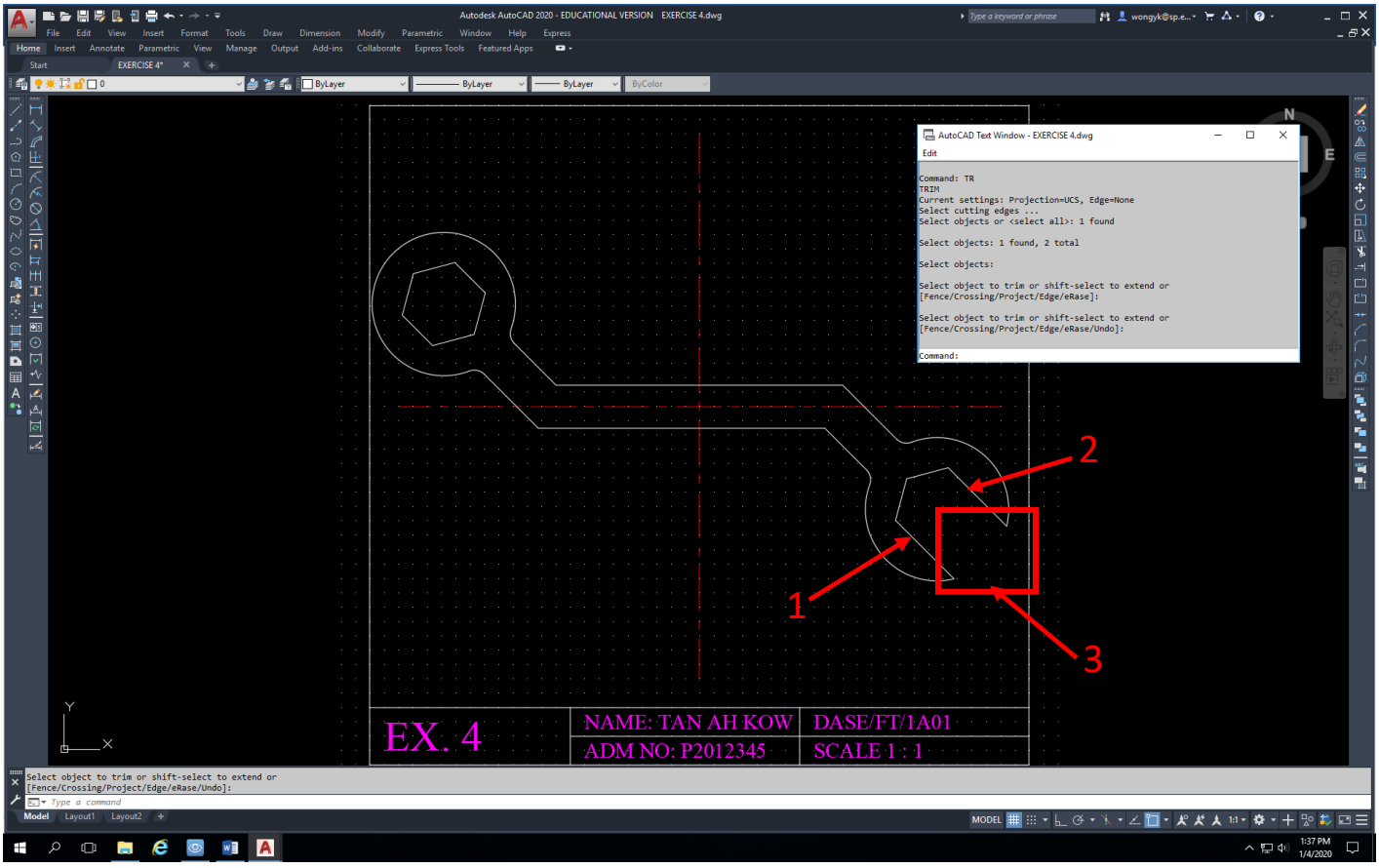

FIG 20

lxxvii. Next, trim the unwanted portion of circle (3) that intersects with the 2 extended lines (1) & (2)

lxxviii. Fig 20 shows the final completed drawing of Exercise 4.

****Please go through the Dimension Demo notes to complete the dimensioning of Exercise 1A, 1B, 2, 3 & 4 before submitting all the 4 weeks exercises on 2D AutoCAD 2020 drawings****

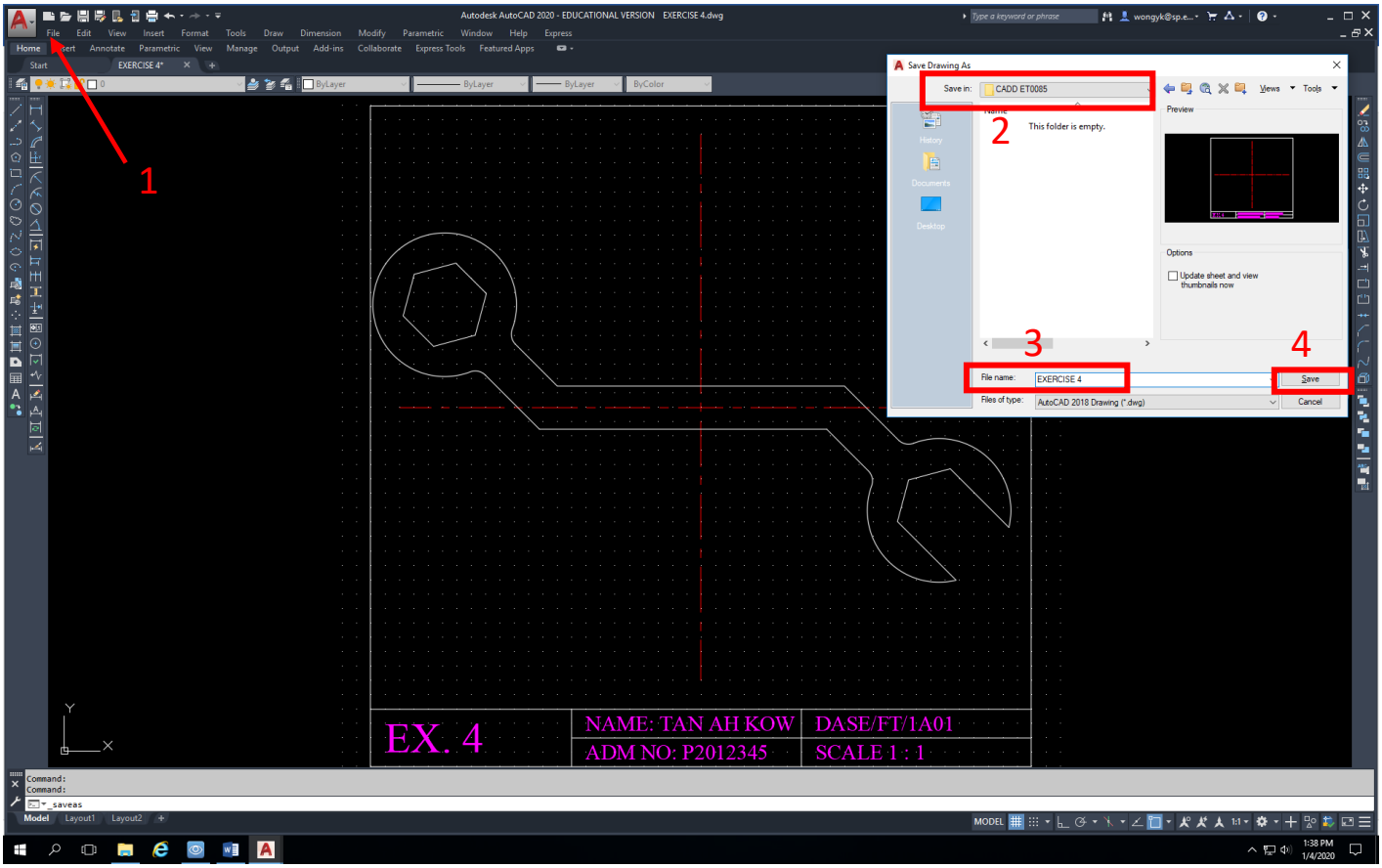

FIG 21

1. Save this drawing as shown in Fig 16:
   i. Click **File ….(1)**
   ii. Click **Saveas** (From File 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 4,** then click **Save** …**(4)**
   v. See Fig 21 indicating steps to save accordingly.

THE END