Assignment-02 (10)

The due date for submitting this assignment has passed.

Due on 2023-08-09, 23:59 IST.

Assignment submitted on 2023-08-09, 23:12 IST

1 point

Few lines of a triangle from the code of the ASCII format of an STL file are:

```
outer loop
      vertex 1.0 1.0 0.0
      vertex 1.0 2.0 1.0
      vertex -2.0 2.0 -1.0
    end loop
```

If the triangle is rotated in 90° CCW about X-axis, then 90° CCW about Y-axis and then 90° CCW about Z-axis, what are the new coordinates of the triangle?

vertex 1.0 1.0 0.0
vertex 1.0 2.0 1.0
vertex -2.0 2.0 -1.0

vertex 0.0 1.0 -1.0
vertex 1.0 2.0 -1.0
vertex -1.0 2.0 2.0

vertex 4.0 4.0 3.0
vertex 4.0 5.0 4.0
vertex 1.0 5.0 2.0

vertex 0.0 -1.0 0.0
vertex 1.0 -2.0 0.0
vertex -2.0 1.0 -1.0

No, the answer is incorrect.
Score: 0

Accepted Answers:
vertex 0.0 1.0 -1.0
vertex 1.0 2.0 -1.0
vertex -1.0 2.0 2.0

1 point

Few lines of a triangle from the code of the ASCII format of an STL file are:

```
    outer loop
      vertex 1.0 1.0 0.0
      vertex 1.0 2.0 1.0
      vertex -2.0 2.0 -1.0
    end loop
```

If the triangle is rotated in 90° CCW about X-axis, then 90° CCW about Y-axis and then 90° CCW about Z-axis, what will be the unit vector corresponding to the new facet normal?

0.639602 -0.639602 0.426401

-0.426401 -0.639602 0.639602

-0.426401 0.639602 0.639602

0.426401 0.639602 0.639602

Yes, the answer is correct.
Score: 1

Accepted Answers:
0.639602 -0.639602 0.426401

1 point

Few lines of a triangle from the code of the ASCII format of an STL file are:

```
outer loop
  vertex 1.0 1.0 0.0
  vertex 1.0 2.0 1.0
  vertex -2.0 2.0 -1.0
end loop
```

If the triangle is translated +3 unit along X-axis, then +3 unit along Y-axis and then +3 unit along Z-axis, what will be the unit vector corresponding to the new facet normal?

0.639602 -0.639602 0.426401

-0.426401 -0.639602 0.639602

-0.426401 0.639602 0.639602

0.426401 0.639602 0.639602

Yes, the answer is correct.
Score: 1

Accepted Answers:
-0.426401 -0.639602 0.639602

1 point

Few lines of a triangle from the code of the ASCII format of an STL file are:

```
outer loop
  vertex 1.0 1.0 0.0
  vertex 1.0 2.0 1.0
  vertex -2.0 2.0 -1.0
end loop
```

If the triangle is translated +3 unit along X-axis, then +3 unit along Y-axis and then +3 unit along Z-axis, what are the new coordinates of the triangle?

vertex 1.0 1.0 0.0
vertex 1.0 2.0 1.0
vertex -2.0 2.0 -1.0

vertex 0.0 1.0 -1.0
vertex 1.0 2.0 -1.0
vertex -1.0 2.0 2.0

vertex 4.0 4.0 3.0
vertex 4.0 5.0 4.0
vertex 1.0 5.0 2.0

vertex 0.0 -1.0 0.0
vertex 1.0 -2.0 0.0
vertex -2.0 1.0 -1.0

No, the answer is incorrect.
Score: 0

Accepted Answers:
vertex 4.0 4.0 3.0
vertex 4.0 5.0 4.0
vertex 1.0 5.0 2.0

1 point

5. In an AM process, the triangles of the STL file with facet normal at an angle more than 120° from the build direction require a support structure. A few lines of a triangle from the code of the ASCII format of the STL file are:

```
outer loop
    vertex 1.0 1.0 0.0
    vertex 1.0 2.0 0.0
    vertex 4.0 2.0 1.0
end loop
```

Does this triangle require a support structure if the build direction is +Z?

- Yes
- No
- May or may not be required
- Not sufficient information

Yes, the answer is correct.
Score: 1

Accepted Answers:
Yes

1 point

In an AM process, the triangles of the STL file with facet normal at an angle more than 120° from the build direction require a support structure. A few lines of a triangle from the code of the ASCII format of the STL file are:

```
outer loop
    vertex 1.0 1.0 0.0
    vertex 1.0 2.0 0.0
    vertex 2.0 2.0 1.0
end loop
```

Select the correct option, if the build direction is +Z?

- The triangle does not require a support structure
- The triangle does not require a support structure if it is translated by +3 units along X-axis
- The triangle does not require a support structure if it is rotated by 45° CW about Y-axis
- The triangle does not require a support structure if it is rotated by 45° CW about Z-axis

Yes, the answer is correct.
Score: 1

Accepted Answers:
The triangle does not require a support structure if it is rotated by 45° CW about Y-axis

1 point

A sphere has to be built by an AM process in which the triangles of the STL file with facet normal at an angle more than 45° from the build direction require a support structure. Select the correct option

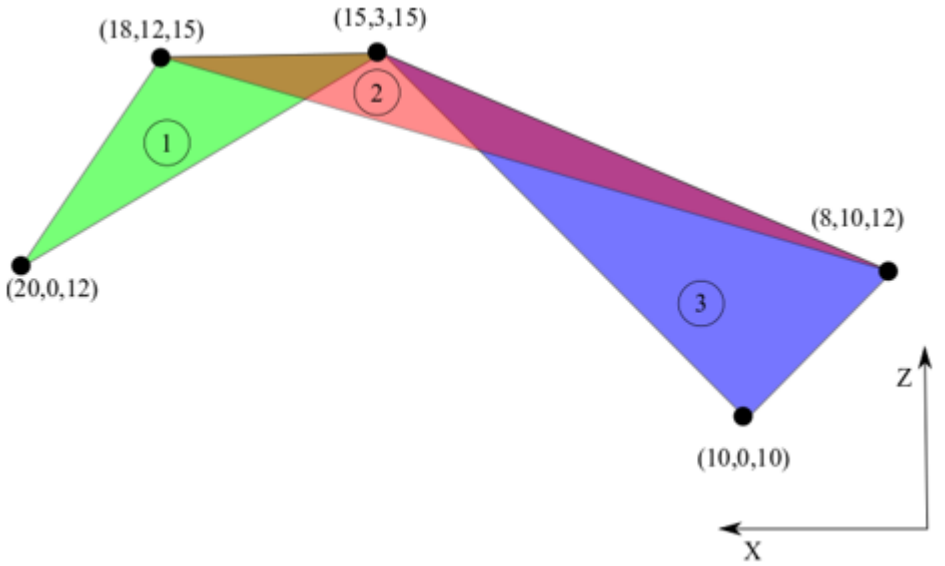
- More than 2/3 surface area of the object will require support
- Less than 1/4 surface area of the object will require support
- Less than 1/8 surface area of the object will require support
- More than 5/6 surface area of the object will require support

No, the answer is incorrect.
Score: 0

Accepted Answers:
Less than 1/4 surface area of the object will require support

1 point

The following three triangles require the support structure in an STL file.



Assume if the build-direction is +Z and the base is at . Find out the volume of the support.

- ≈1311
- ≈760
- ≈86000
- ≈66

No, the answer is incorrect.
Score: 0

Accepted Answers:
≈1311

1 point

Following are the three facet normal form an STL file.

1. facet normal +0.975 0.000 -0.223
2. facet normal +0.434 0.000 -0.901
3. facet normal -0.782 0.000 +0.625

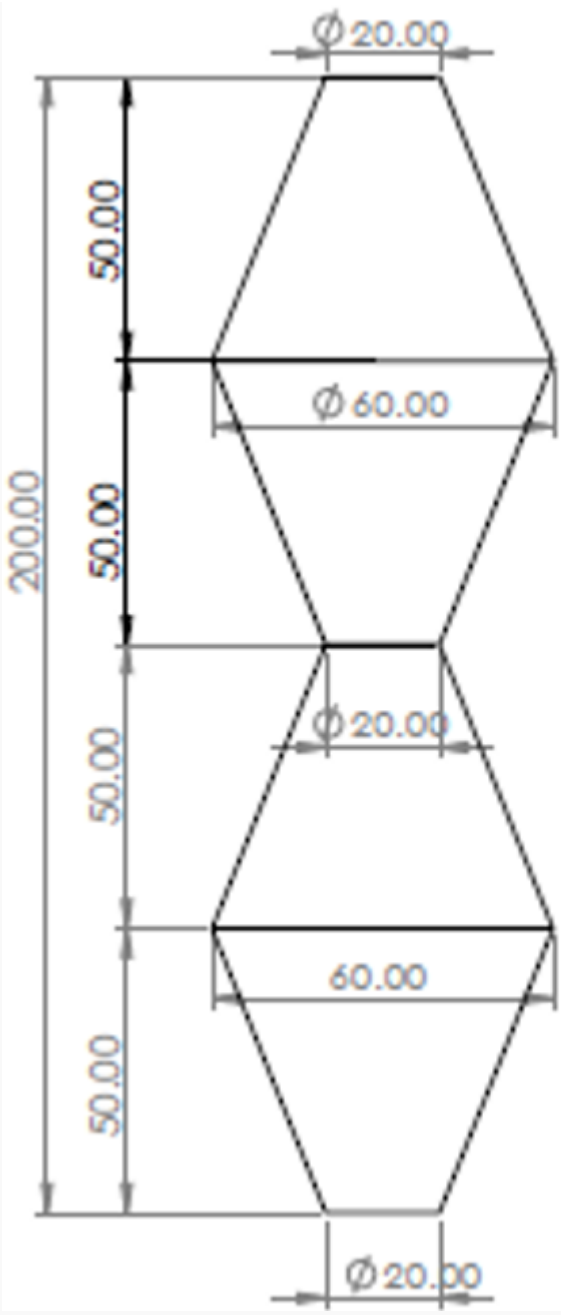
If the build-direction is +Z and the base is at Z=0, which of the three facet normal you will recommend to examine for the requirement of the support structure?

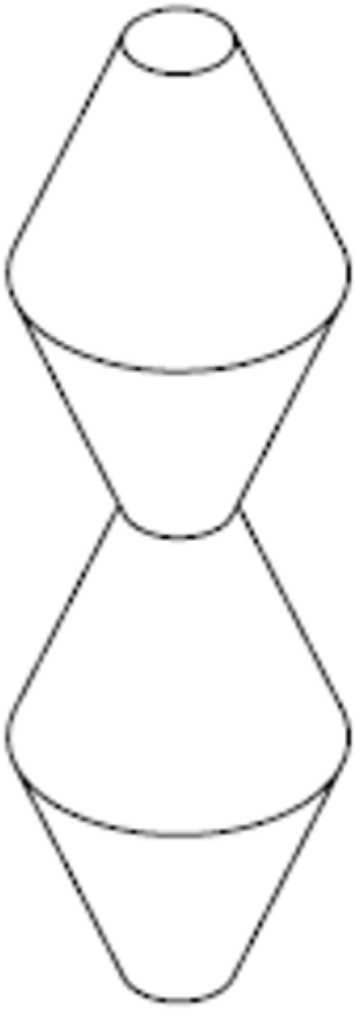
- 1 & 2
- 2 & 3
- 1 & 3
- None of the normal

No, the answer is incorrect.
Score: 0

Accepted Answers:
1 & 2

1 point
The object shown in Figure has to be fabricated by an Additive Manufacturing process





Consider the CONTAINMENT METHOD of support generation from contours. If the volume of this part is 272271.36 mm^3 find out the total volume of the required support material.

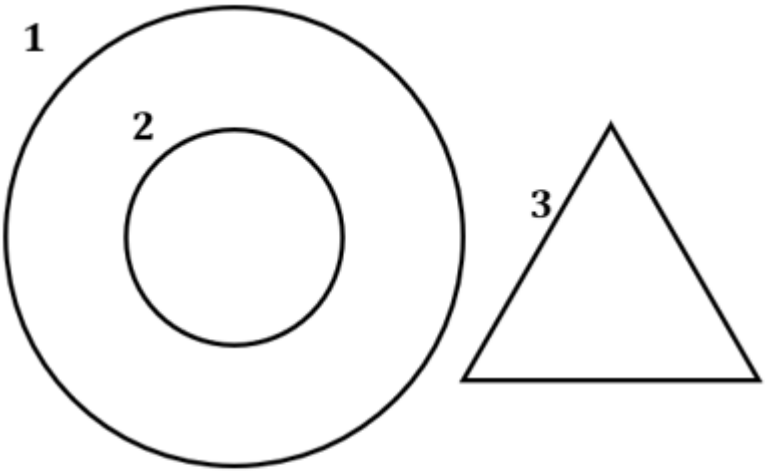
- ≈20944
- ≈293215
- ≈565487
- ≈62832

Yes, the answer is correct.
Score: 1

Accepted Answers:
≈293215

1 point

The missing elements of the relationship matrix for the contour organization of the given part are



i \ j	1	2	3
1	a_{11} =?	1	0
2	-1	a_{22} =?	a_{23} =?
3	0	0	2

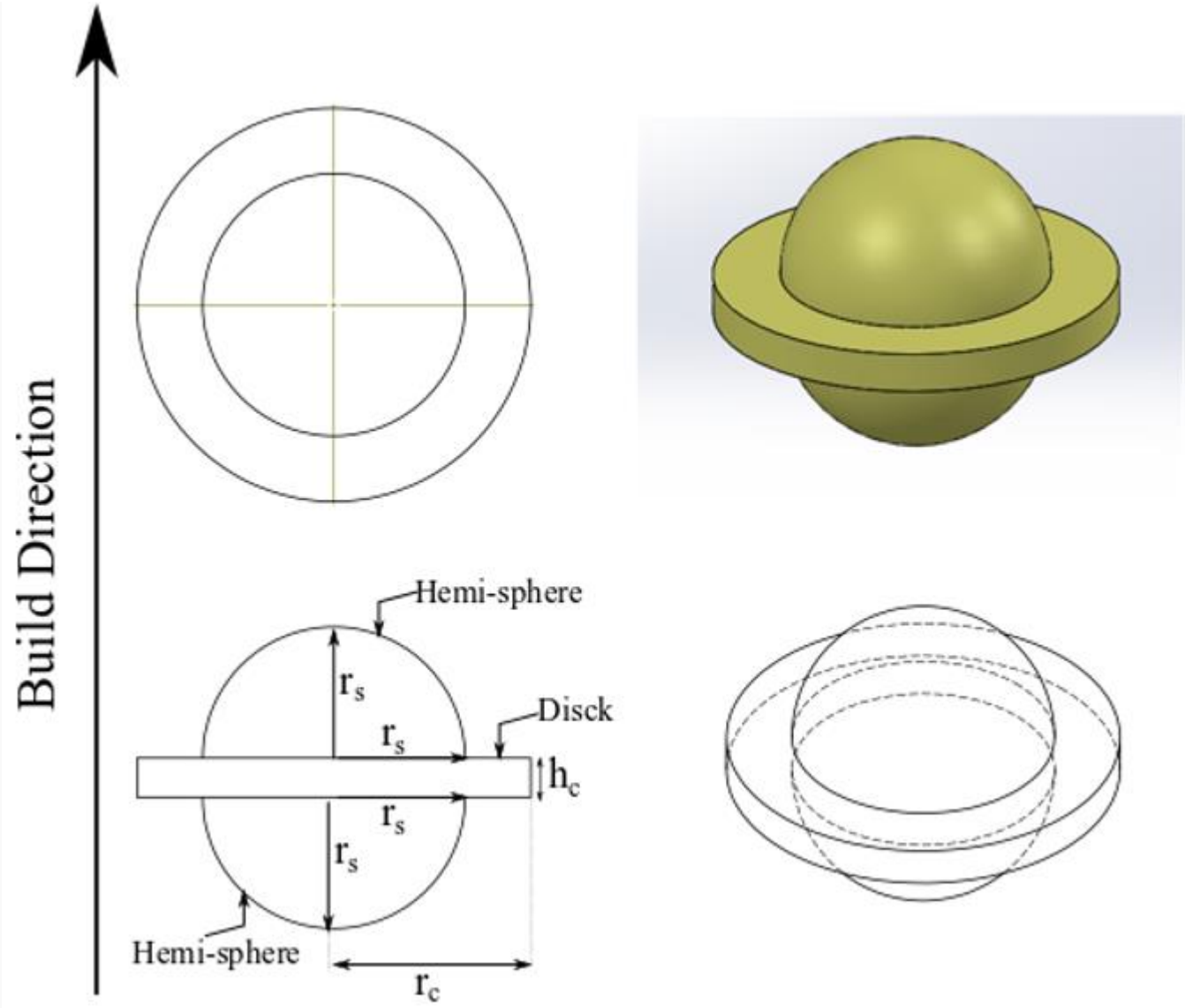
- a11=2,a22=2,a23=-0
- a11=0,a22=1,a23=-1
- a11=1,a22=-2,a23=0
- a11=1,a22=-1,a23=0

No, the answer is incorrect.
Score: 0

Accepted Answers:
a11=2,a22=2,a23=-0

1 point

The object shown in Figure has to be fabricated by an Additive Manufacturing process



Consider the OPTIMAL METHOD of support generation from contours. If the ratio $(r_c/r_s)=2$, then find out ratio of volume of the stale and fresh support (V_s/V_f)

.

- 9
- 4
- 3
- 16

Yes, the answer is correct.
Score: 1

Accepted Answers:
9

1 point

The optimal build orientation of a part can be obtained by minimizing the _____

- Only the pre-processing cost

- Only the post-processing cost
- Only the machine utilization cost
- Only the material cost
- Only the pre-processing & material cost
- The summation of cost given in option a, b, c & d

Yes, the answer is correct.
Score: 1

Accepted Answers:
The summation of cost given in option a, b, c & d

1 point
A part to be manufactured by an AM process has been examined in 3 angular positions. Corresponding to these angular positions following was observed:

Orientation – 1:

Overhanging Triangle	Project area on base
1	30 mm^2
2	40 mm^2
3	20 mm^2
4	60 mm^2
5	80 mm^2

Orientation – 2:

Overhanging Triangle	Project area on base
1	20 mm^2
2	10 mm^2
3	20 mm^2
4	50 mm^2
5	70 mm^2
6	05 mm^2
7	07 mm^2
8	15 mm^2
9	20 mm^2
10	10 mm^2

Orientation – 3:

Overhanging Triangle	Project area on base
1	100 mm^2
2	100 mm^2
3	20 mm^2
4	50 mm^2
5	70 mm^2
6	10 mm^2
7	20 mm^2

Which of the orientation is optimal based on the “support minimization model”

- Orientation -1
- Orientation -2

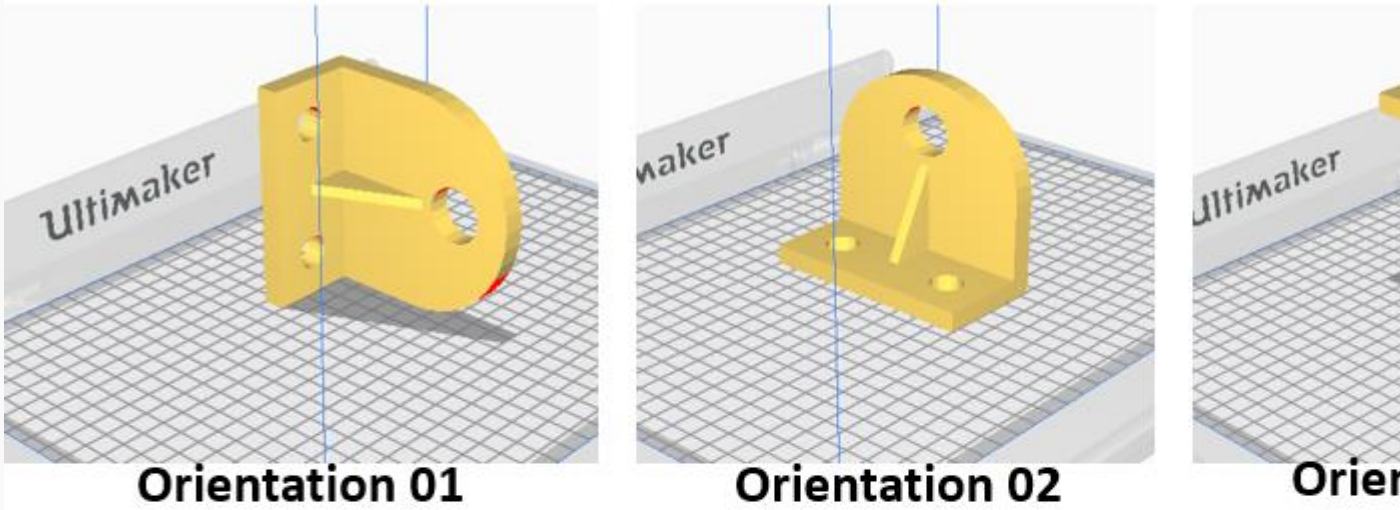
Orientation -3

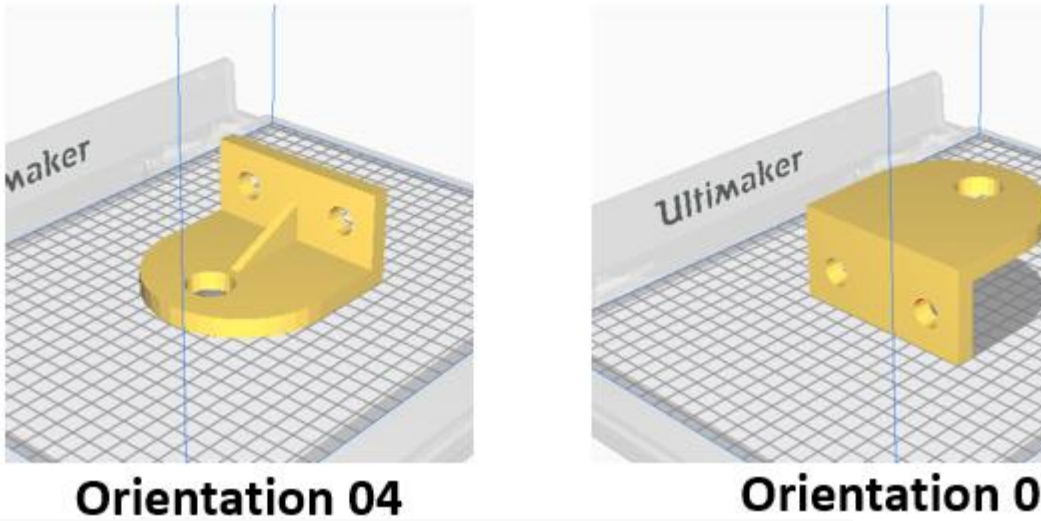
Insufficient data

Yes, the answer is correct.
Score: 1

Accepted Answers:
Orientation -2

1 point
Consider the following 5 orientations of a CAD model:





Select the correct statement/s

In orientation ‘2’ the number of holes with their axes in the build direction are minimum

In orientation ‘3’ the number of up-facing horizontal surfaces are maximum

In orientation ‘4‘ the size of the area of the base surface is maximum

In orientation ‘1’ the number of holes with their axes in the build direction are maximum

Yes, the answer is correct.
Score: 1

Accepted Answers:

In orientation '4' the size of the area of the base surface is maximum

1 point

Following are the two options for different methods of slicing based on data input, layer thickness, layer shape, & build approach

a)Direct 1.Bottom – top
b)Uniform 2.Conformal
c)Horizontal 3.Adaptive
d)Top – bottom 4.Indirect

Select the correct match with the opposite method

- a)→4, b)→2, c)→3, d)→1
- a)→1, b)→2, c)→3, d)→4
- a)→4, b)→3, c)→2, d)→1
- a)→1, b)→3, c)→2, d)→4

No, the answer is incorrect.
Score: 0

Accepted Answers:
a)→4, b)→3, c)→2, d)→1

1 point

In a manufacturing facility the parts fabricated on a Directed Energy Deposition machine are post-processed on a CNC machine to improve the surface finish. In such a facility, which slicing approach will you recommend for fabricating the parts by DED.

- Top-Bottom Approach
- Negative – Tolerance
- Bottom-Top Approach
- Positive – Tolerance

No, the answer is incorrect.
Score: 0

Accepted Answers:
Positive – Tolerance

1 point

An object is built in +Z direction by an AM process. A few lines of a triangle from the code of the ASCII format of the STL file of the object are:

```
outer loop
    vertex 1.0 1.0 0.0
    vertex 1.0 2.0 0.0
    vertex 2.0 2.0 1.0
end loop
```

How many intersection point/s will be obtained between this triangle and a slicing plane Z=2.

- One point
- Two points
- Three points
- There is not any intersection point

No, the answer is incorrect.
Score: 0

Accepted Answers:

There is not any intersection point

1 point

An object is built in +Z direction by an AM process. A few lines of a triangle from the code of the ASCII format of the STL file of the object are:

```
    outer loop
        vertex 1.0 1.0 0.0
        vertex 1.0 2.0 0.0
        vertex 2.0 2.0 1.0
    end loop
```

The number of intersection point between this triangle and slicing plane Z=1 & Z=0 are ___ & ___

- 1, 2
- 1, 0
- 0,1
- 2, 1

No, the answer is incorrect.
Score: 0

Accepted Answers:
1, 2

1 point

An object is built in +Z direction by an AM process. A few lines of a triangle from the code of the ASCII format of the STL file of the object are:

```
    outer loop
        vertex 1.0 1.0 0.0
        vertex 1.0 2.0 0.0
        vertex 2.0 2.0 1.0
    end loop
```

Find out the intersection point/s between this triangle and a slicing plane Z=0.5

- (1.5, 2, 0.5) & (1.5, 1.5, 0.5)
- Only (1.5, 1.5, 0.5)
- Only (1.5, 2, 0.5)
- There is not any intersection point

Yes, the answer is correct.
Score: 1

Accepted Answers:
(1.5, 2, 0.5) & (1.5, 1.5, 0.5)