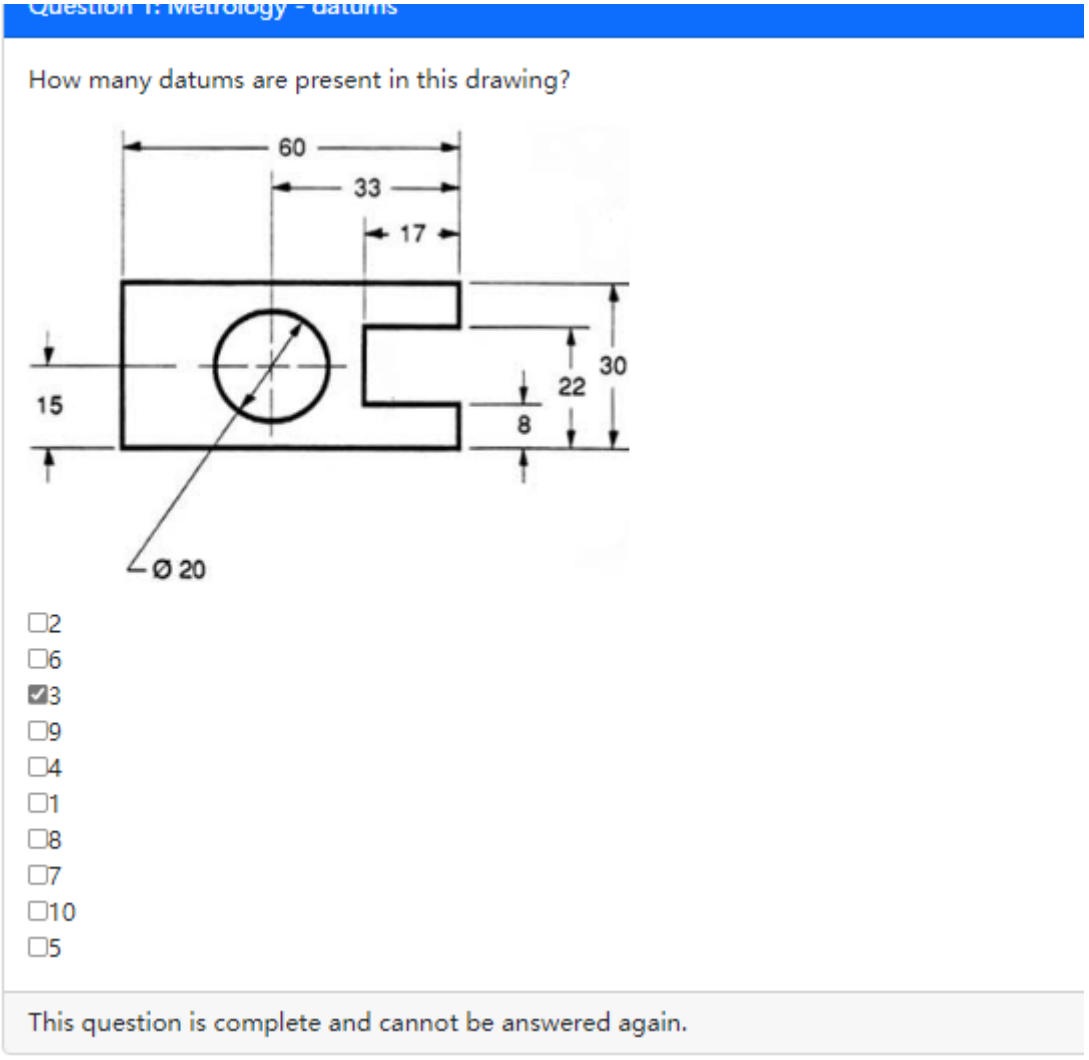
# me270hw6 GDT

# question

# 1




How many datums are present in this drawing?

**Answer**

3

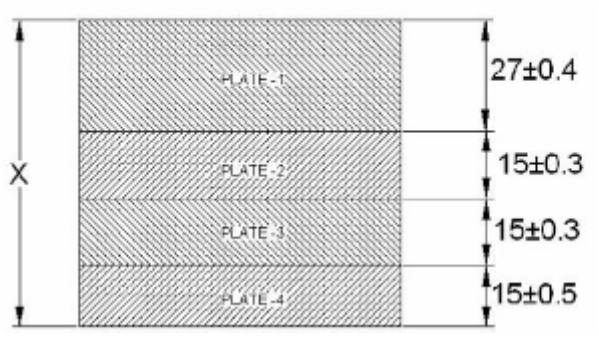
# q2

What are the maximum and minimum possible values of x?

(27+- 0.4)(15+- 0.3)(15+- 0.3)(15+- 0.5)

Max = 73.5 // Minimum = 70.5

What are the maximum and minimum possible values of x?




**Answer**
73.5 70.5

# q3

What is the MMC for a shaft with a nominal diameter of 3.2 +- 0.9 cm

ADD the two number
(MMC = diameter + (Biggest Shaft)

**Answer**

(MMC = diameter + (Biggest Shaft)

# q4

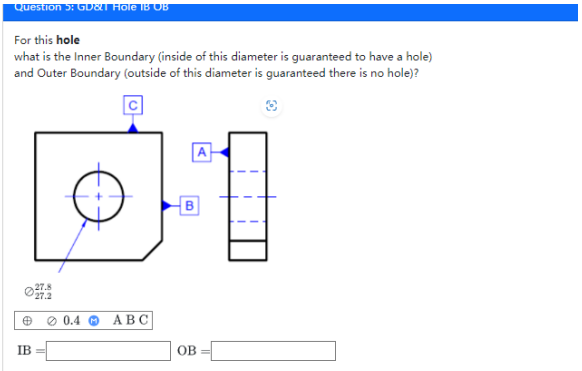
What is the LMC for a hole with a nominal diameter of 3.9 +- 0.4 cm

ADD the two number
(LMC= diameter + ) (Smallest hole)

Diameter = 4.3 cm

**Answer**
(LMC= diameter + ) (Smallest hole)

# q5




For this hole what is the Inner Boundary (inside of this diameter is guaranteed to have a hole)and Outer Boundary (outside of this diameter is guaranteed there is no hole)?

hole size(48.6 / 48.2), with tolerance 0.3

IB = 48.2 - 0.3 = 47.9 (MMC - Zone) (Area guaranteed to have hole = largest erfect pin that can mate)
OB = 48.6+0.3 + (48.6 - 48.2)= 49.3 (LMC- Zone) (Area without a hole)

Python
Q21

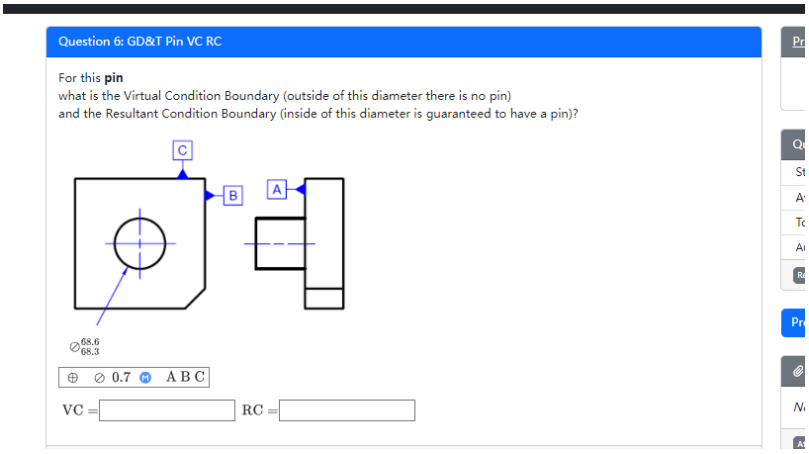
a= 48.6 / hole size
b = 48.2 / hole size
c = 0.3 / tolerance

IB = 47.9 // OB = 49.3

e OB would be found by:

1. Identifying the larger hole(38.7)
2. Adding the .5
3. Take the difference between the larger and smaller holes
4. Add answer of 2 to answer of 3

# q6




For this pin what is the Virtual Condition Boundary (outside of this diameter there is no pin)and the Resultant Condition Boundary (inside of this diameter is guaranteed to have a pin)?

pin size(66.5 / 66.2) with tolerance 0.5

VC = 66.5+0.5 = 67 (MMC + Zone) (VC = area that is pin free = smallest perfect hole)
RC = 66.2 - 0.5 = 65.7 - (66.5-66.2) = 65.4 (LMC - Zone) (RC = area guaranteed to have a pin)

Python
Q22

a= 66.5/ hole size
b = 66.2 / hole size
c = 0.5 / tolerance

VC = 67 // RC = 65.4

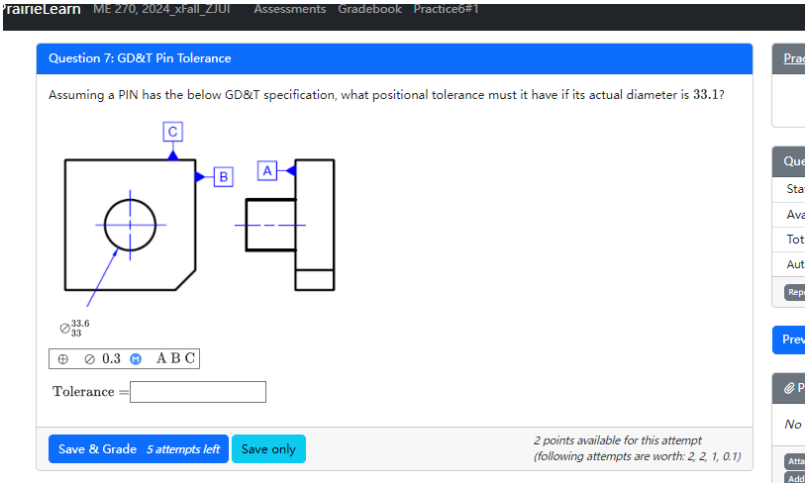
# q7

Assuming a PIN has the below GD&T specification, what positional tolerance must it have if its actual diameter is 36.4?

Pin size (37.1 / 36) with tolerance 0.7

Python
Q23

37.1 - 36.4 = 0.7
0.7 + tolerance (0.7) = 1.4



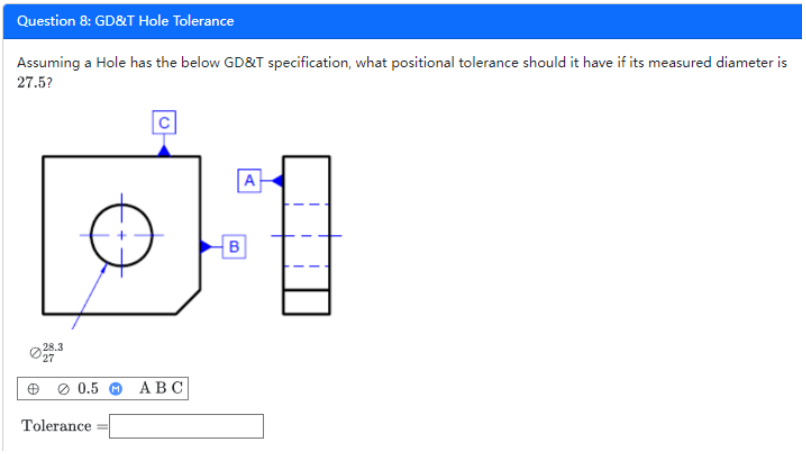

# q8

Assuming a Hole has the below GD&T specification, what positional tolerance should it have if its measured diameter is 28.2?

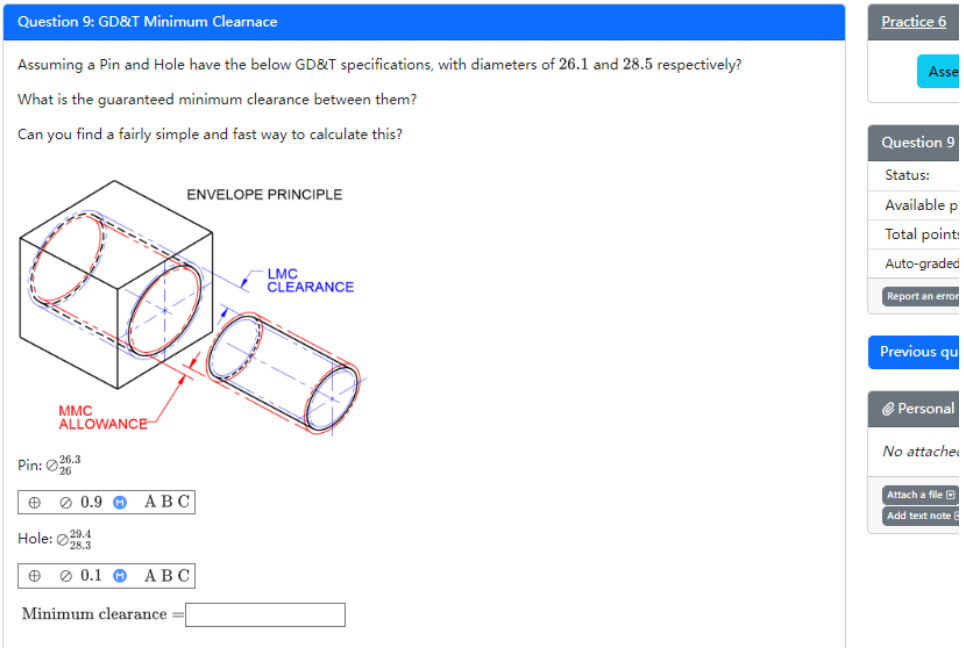
Hole size (29.1 / 28) with tolerance 0.6

Python
Q24

28 - 28.2 = 0.2
0.2 + tolerance (0.6) = 0.8




# q9




Assuming a Pin and Hole have the below GD&T specifications, with diameters of and respectively?
What is the guaranteed minimum clearance between them?
Can you find a fairly simple and fast way to calculate this?

Pin(29.1 / 28) tolerance 0.8
Hole (32.4/31.1) tolerance 0.6

Python
Q25

Minimum clearance = 0.6
Clearance = IB - VC

IB (Hole)= MMC - Tolerance
= 31.1 - 0.8 = 30.3

VC (Pin) = MMC + Tolerance
= 29.1 + 0.6 = 29.7

Clearance = 30.3 - 29.7 = 0.6

```
pin1=26.3

pin2=26

pt=0.9



hole1=29.4

hole2=28.3
```

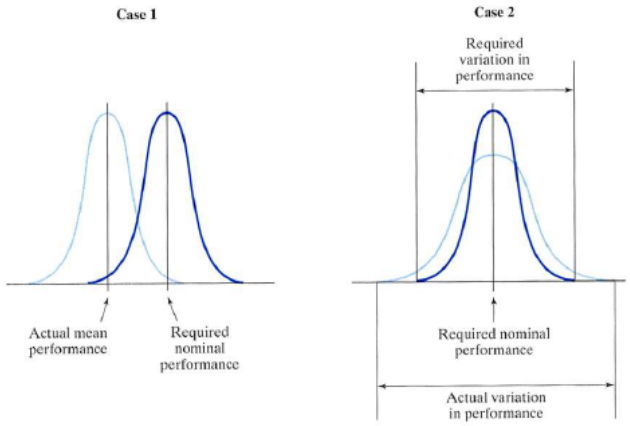
```
ht=0.1



ibhole=hole2-ht

vcpin=pin1+pt



clearance=ibhole-vcpin

print(clearance)
```

# 10 Quality control is:

ensuring interchangeability
lowest cost
least variation
reducing tolerance
on-target

**Answer**
on-target
least variation

- **Case 1**强调了目标一致性（On-target），即过程的平均性能应尽可能接近所需标称性能。
- **Case 2**则强调了最小变异（Least variation），即过程的性能分布应尽可能紧密地围绕所需标称性能，以减少不合格品率。

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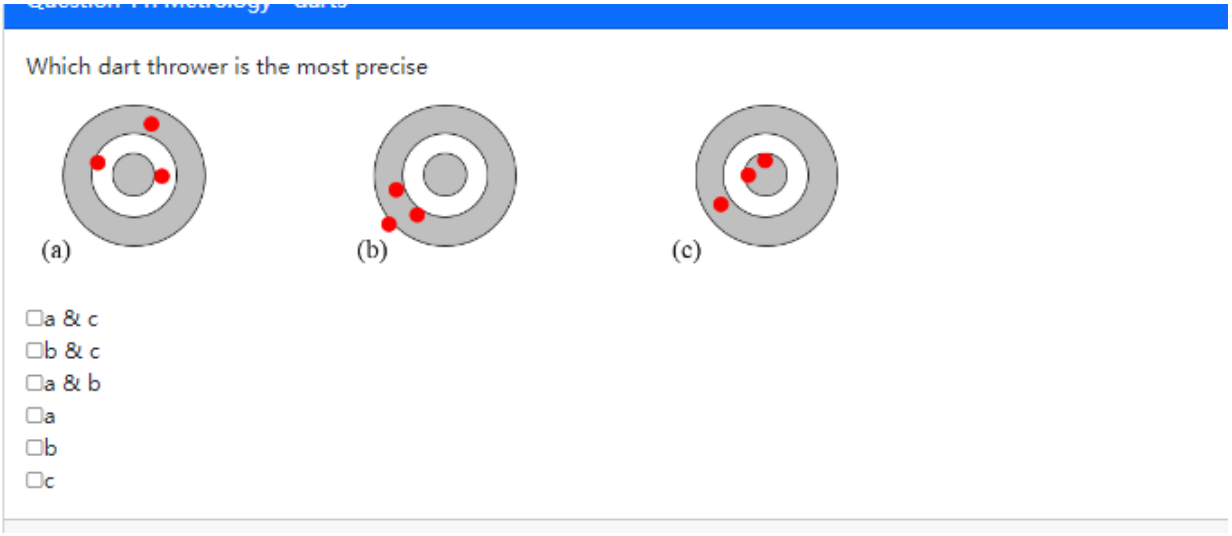
# q11

Which dart thrower is the most precise

b




# 12 Stack Tolerance

Determine the tolerance of X, assuming each plate has either a uniform distribution or Gaussian distribution? (round answer to 2 decimal places)?

(27+-0.4)(15+-0.3)(15+-0.3)(15+-0.5)

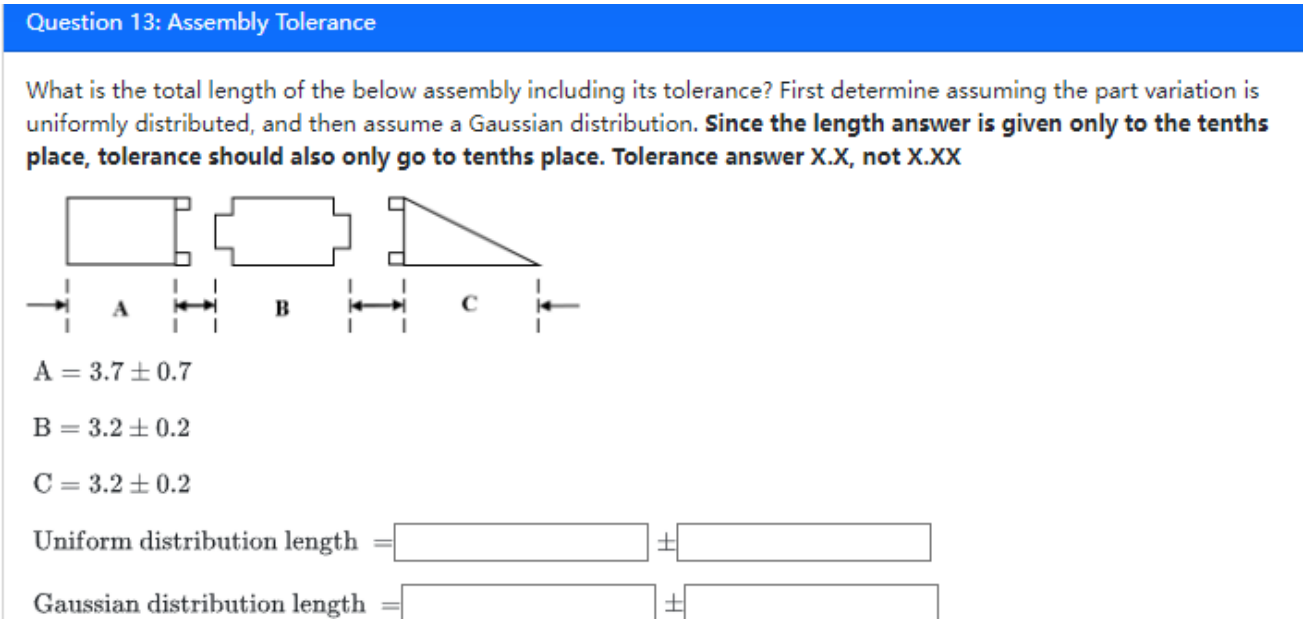
Uniform tolerance = +- 1.5
Gaussian Tolerance = +-0.768115

Uniform = add up all tolerance
Gaussian = ((x)^2+(x1)^2+(x2)^2+....)^1/2

Uniform tolerance=±(0.4+0.3+0.3+0.5)=±1.5 (tol的和)

Gaussian tolerance=$sqrt(0.4**2+0.3**2+0.3**2+0.5**2) = sqrt(59)/10 \approx 0.76811457$

# 13 Assembly Tolerance




What is the total length of the below assembly including its tolerance? First determine assuming the part variation is uniformly distributed, and then assume a Gaussian distribution

A 3.9 +- 0.5
B = 3.5 +- 0.3
C = 3.4 +- 0.1

Python
Q26

Uniform tolerance = 10.8 +- 0.9
Gaussian Tolerance = 10.8 +- 0.6

Uniform = add up all tolerance
Gaussian = ((x)^2+(x1)^2+(x2)^2+....)^1/2