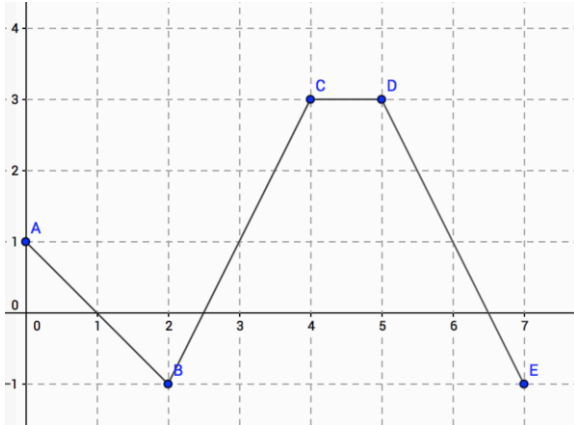**#1 Calculus – Hustle**
National MAO Convention 2022
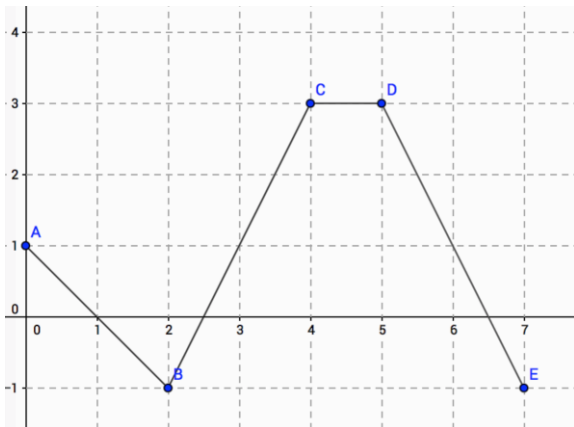

Find the sum of all x values for the graph
of y in the interval (0, 7) where the graph is not
differentiable.

Answer : _____

Round   1   2   3   4   5

#1 Calculus – Hustle
National MAO Convention 2022
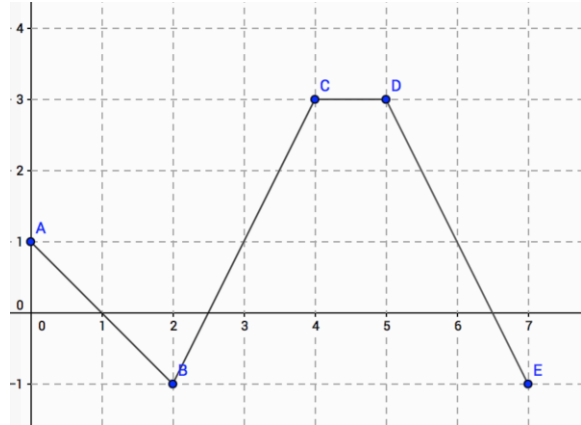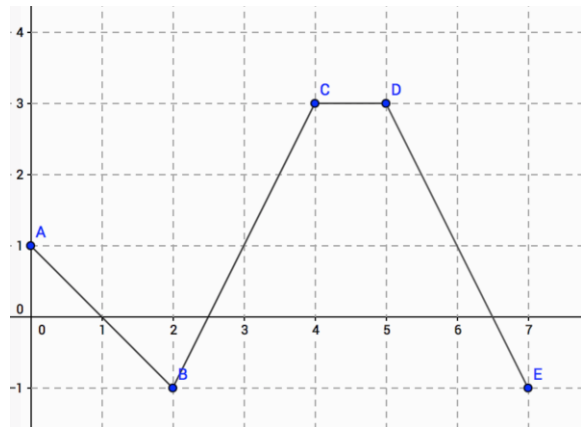

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#1 Calculus – Hustle
National MAO Convention 2022

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Round   1   2   3   4   5
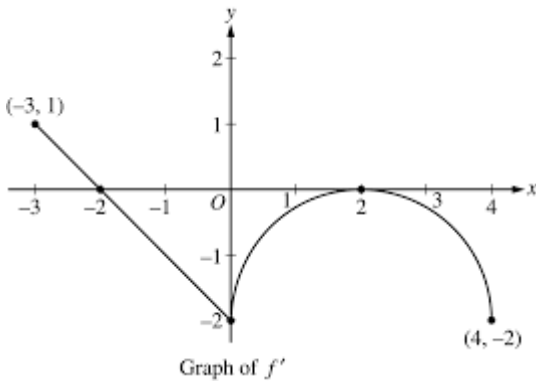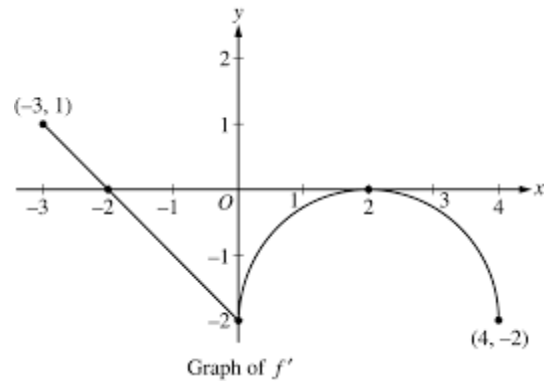

#1 Calculus – Hustle
National MAO Convention 2022

Find the sum of all x values for the graph
of y in the interval (0, 7) where the graph is not
differentiable.

Answer : _____

Round   1   2   3   4   5

#2 Calculus – Hustle
National MAO Convention 2022

Graph of f'

Give the x value where a relative minimum exists on the graph of f(x). If there is no solution, write "none".

Answer : _____

Round   1   2   3   4   5
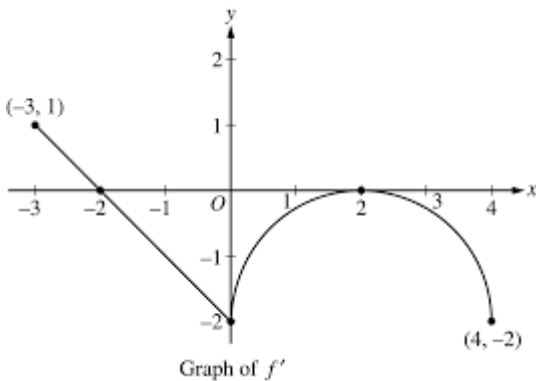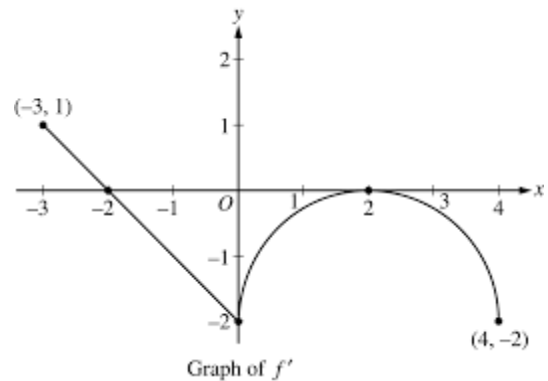
#3 Calculus – Hustle
National MAO Convention 2022

$$\int \frac{x+2}{x^2+8x+12}\,dx$$

Answer : _____

Round   1   2   3   4   5

#4 Calculus – Hustle
National MAO Convention 2022

$$g(x) = \begin{cases} -x, & x < -2 \\ \dfrac{1}{2}x^2 - 1, & -2 \le x < 2 \\ -x + 3, & x > 2 \end{cases}$$

$$\lim_{x \to 2} g(x) + \lim_{x \to -2^+} g(x) + \lim_{x \to -2^-} g(x)$$

Answer : _____

Round 1 2 3 4 5

#5 Calculus – Hustle
National MAO Convention 2022

$$\int_{-1}^{3} |x| dx$$

Answer : _____

Round   1   2   3   4   5

#6 Calculus – Hustle
National MAO Convention 2022

$$\int_{\frac{\pi}{4}}^{\frac{3\pi}{2}} \frac{1}{3}\theta^2 dx$$
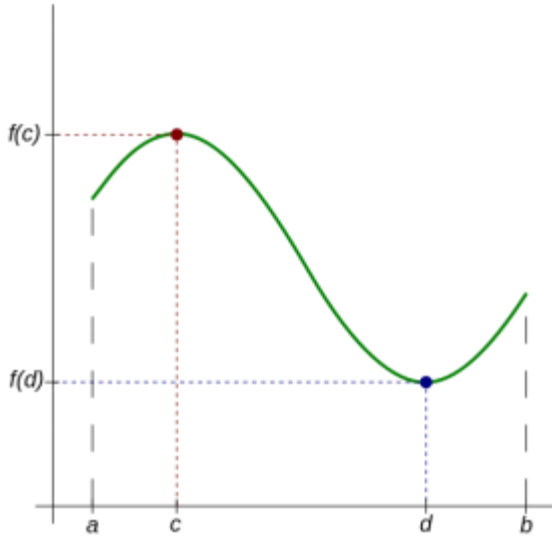
Answer : _____

Round   1   2   3   4   5

#7 Calculus – Hustle
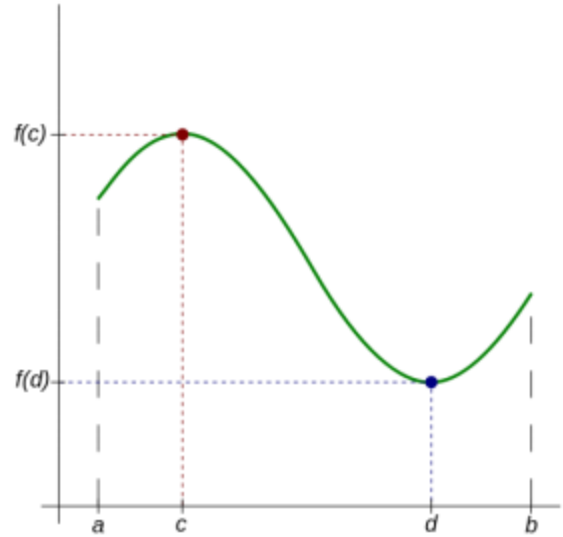**National MAO Convention 2022**

If a function $f(x)$ is continuous on a closed interval $[a, b]$, then $f(x)$ has both a maximum and a minimum on $[a, b]$. Give the **acronym** of this theorem.

Answer : _____

Round   1   2   3   4   5

#7 Calculus – Hustle
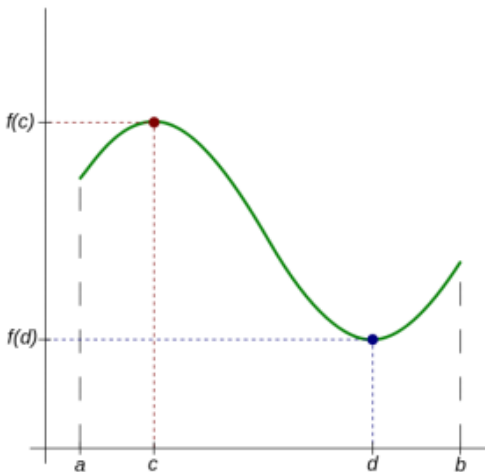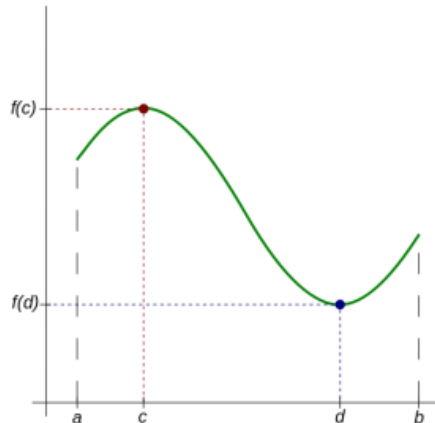**National MAO Convention 2022**

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Answer : _____

Round   1   2   3   4   5

#8 Calculus – Hustle
National MAO Convention 2022

$$f(x) = x^2 cos(x)$$

$$f'\left(\frac{\pi}{4}\right) = ?$$

Answer : _____

Round   1   2   3   4   5

#9 Calculus – Hustle
National MAO Convention 2022

A right cylinder filled with water has a
4-foot radius and 12-foot height. It is drained
such that the depth of the water is decreasing at
0.4 feet per second. How fast is the water
draining from the tank?

Answer : _____

Round   1   2   3   4   5

#10 Calculus – Hustle
National MAO Convention 2022
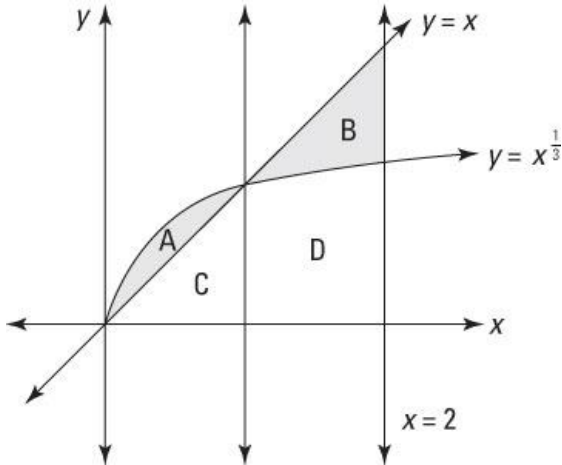
If the average value of f(x) on the interval [0,2]
is 1.4; find the value of :

$$\int_2^0 f(x)dx$$

Answer : _____

Round   1   2   3   4   5

#11 Calculus – Hustle
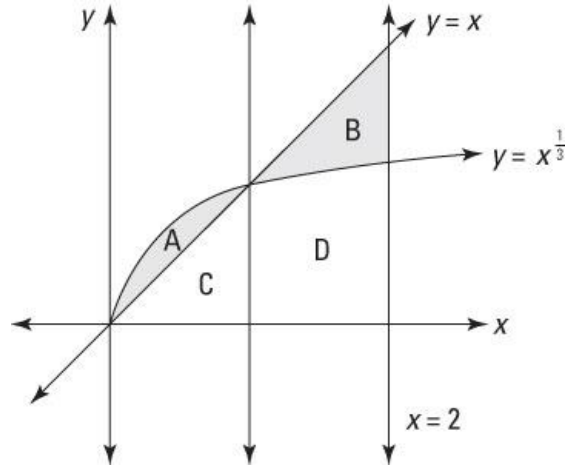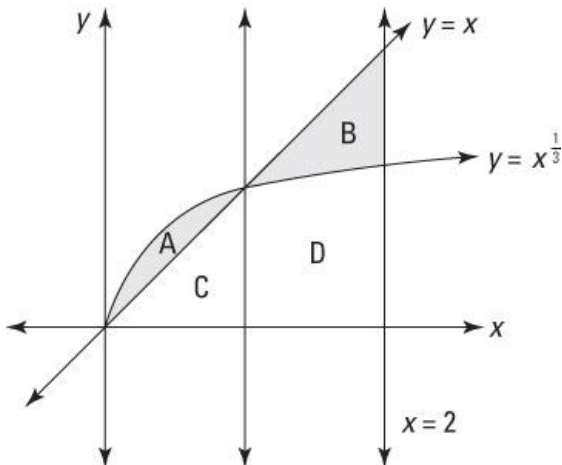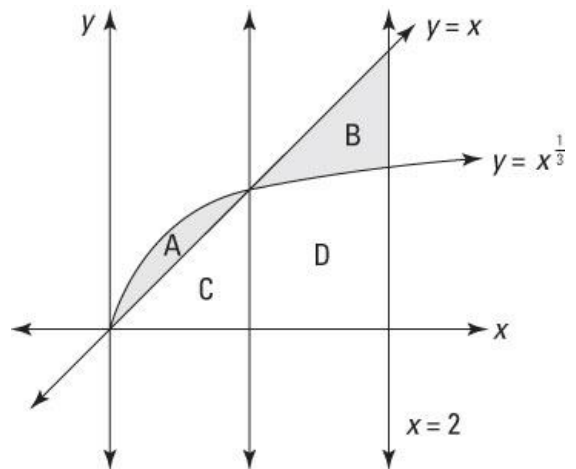**National MAO Convention 2022**

Find the difference between
Area D and Area C.

Answer : _____

Round   1   2   3   4   5

#11 Calculus – Hustle
National MAO Convention 2022

Find the difference between
Area D and Area C.

Answer : _____

Round   1   2   3   4   5

#12 Calculus – Hustle
National MAO Convention 2022

Using the graphs of the equations:
$f(x) = x^2 + 2x$
$g(x) = 48$
 Find the area between the curves.

Answer : _____

Round   1   2   3   4   5

#13 Calculus – Hustle
National MAO Convention 2022

Find the volume of the solid of revolution generated by revolving the region bounded by $y = \sqrt{1 - x^2}$ and $y = 0$ about the x–axis.

Answer : _____

Round   1   2   3   4   5

#14 Calculus – Hustle
National MAO Convention 2022

Determine if the graph of the equation
is Increasing (I), Decreasing (D) or Neither (N)
at the point when x = -1.

$x^2 y = 4$

Answer : _____

Round   1   2   3   4   5

#15 Calculus – Hustle
National MAO Convention 2022

The derivative of a function is given as:

$$\frac{dy}{dx} = 2x^2 - 3x + 1$$

Find the equation of the tangent line to the function in slope-intercept form when x = -4 if a point on the function is (0,1).

Answer : _____

Round   1   2   3   4   5

#16 Calculus – Hustle
National MAO Convention 2022

$$\int_{-1}^{\frac{3}{2}} \cos(\pi y)\, dy$$

Answer : _____

Round   1   2   3   4   5

#17 Calculus – Hustle
National MAO Convention 2022

$$\lim_{x \to \infty} \frac{\sqrt[5]{x^6 - 7x}}{e^{6x}}$$

Answer : _____

Round   1   2   3   4   5

#18 Calculus – Hustle
National MAO Convention 2022

$$\int_{-1}^{0} \sec(\pi x)\tan(\pi x)\, dx$$

Answer : _____

Round 1 2 3 4 5

#19 Calculus – Hustle
National MAO Convention 2022

Find the instantaneous rate of change of the following function:

$$y = 6^{3x^2} x^4$$

when x = 1

Answer : _____

Round   1   2   3   4   5

#20 Calculus – Hustle
National MAO Convention 2022

Find the minimum value of the function

$$y = -2x^3 - \frac{7}{2}x^2 + 5x + 1$$

on the interval [-1,3]

Answer : _____

Round   1   2   3   4   5

#21 Calculus – Hustle
National MAO Convention 2022

A particle's position on the x-axis can be described by the function.

$$s(t) = -6t^3 + 8t^4 + 5$$

Find the interval(s), $t \geq 0$, for which the speed of the particle is increasing.

Answer : _____

Round   1   2   3   4   5

#22 Calculus – Hustle
National MAO Convention 2022

Find the average value of the function:

$$y = -2x^3 + 4x^2 - 5x + 1$$

on the interval [-1,3]

Answer : _____

Round   1   2   3   4   5

#23 Calculus – Hustle
National MAO Convention 2022

A
x	y
-2	-1
-1	-4
0	-5
1	4

B
x	y
-2	4
-1	1
0	0
1	-1

C
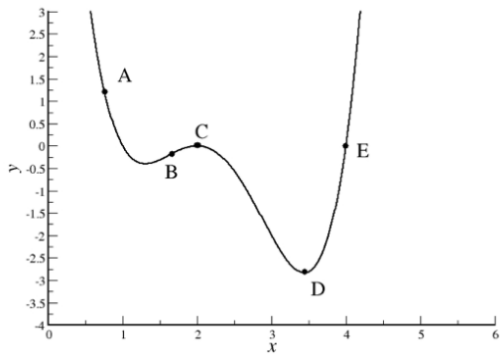| x	y
-2	6
-1	3
0	0
1	3

D
x	y
-2	0
-1	2
0	4
1	6

Give the letter for the function with the least average rate of change of y on x for the interval [-2,0].

Answer : _____

Round   1   2   3   4   5

#24 Calculus – Hustle
National MAO Convention 2022

Given the graph above which represents the derivative of an equation with x-coordinates labeled as letters A-E, find all x coordinates (Letters A-E) of points of inflection of the original equation's graph.

Answer : _____

Round 1 2 3 4 5

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Given the graph above which represents the derivative of an equation with x-coordinates labeled as letters A-E, find all x coordinates (Letters A-E) of points of inflection of the original equation's graph.

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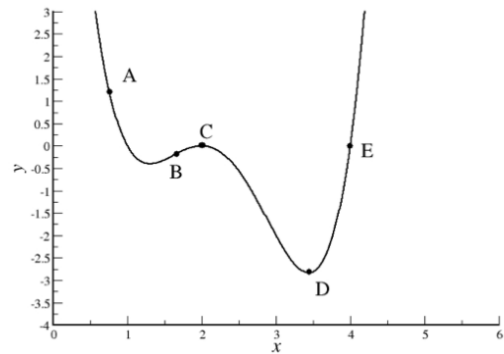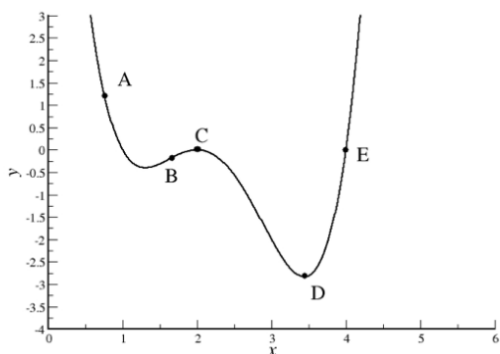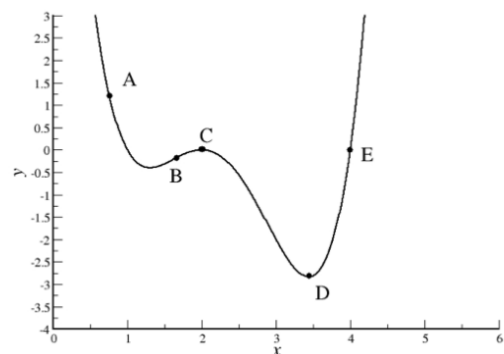**National MAO Convention 2022**

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Answer : _____

Round 1 2 3 4 5

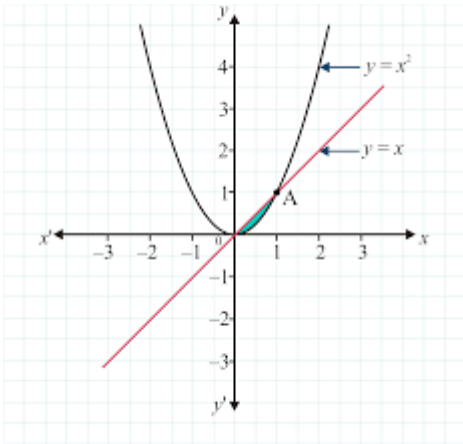**#24 Calculus – Hustle**
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Answer : _____

Round 1 2 3 4 5

#25 Calculus – Hustle
National MAO Convention 2022

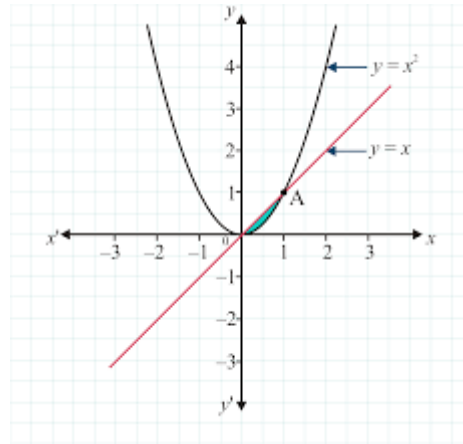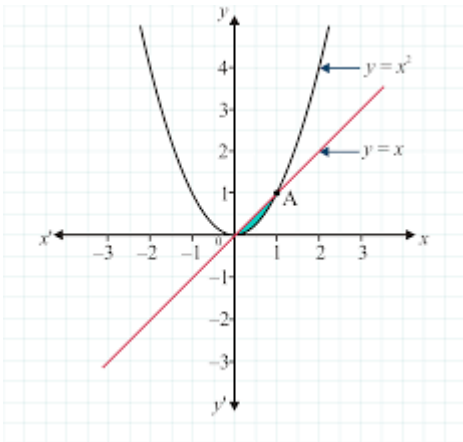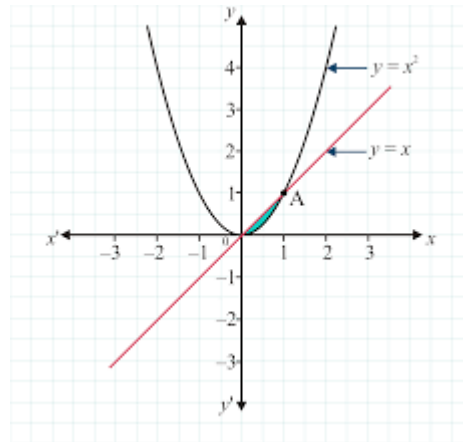Find the exact value of the area of the shaded region.

Answer : _____

Round 1 2 3 4 5