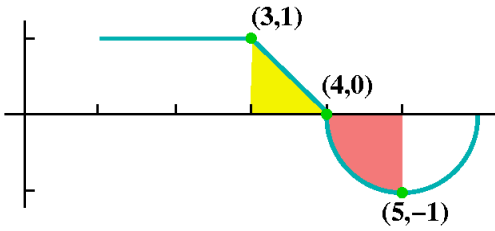


#1 Calculus - Hustle
MA© National Convention 2017

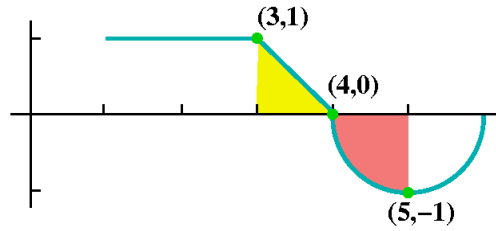


Find the exact value of the area of the shaded regions, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#1 Calculus - Hustle
MA© National Convention 2017

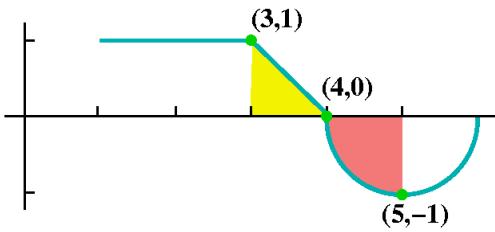


Find the exact value of the area of the shaded regions, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#1 Calculus - Hustle
MA© National Convention 2017

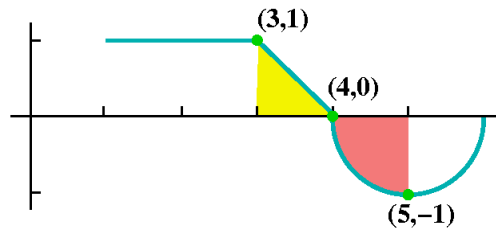


Find the exact value of the area of the shaded regions, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#1 Calculus - Hustle
MA© National Convention 2017

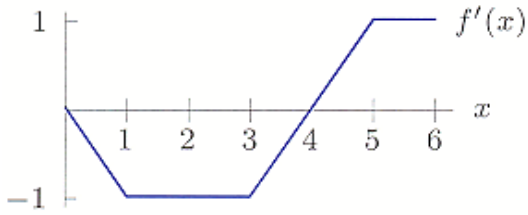


Find the exact value of the area of the shaded regions, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#2 Calculus - Hustle
MA@ National Convention 2017

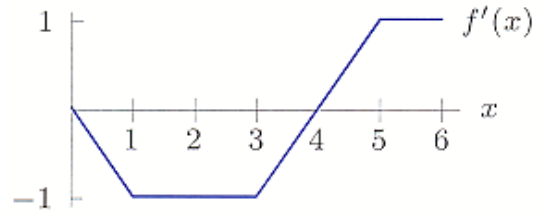


Give the x value where a relative minimum exists on the graph of $f(x)$.

Answer : _____

Round 1 2 3 4 5

#2 Calculus - Hustle
MA@ National Convention 2017

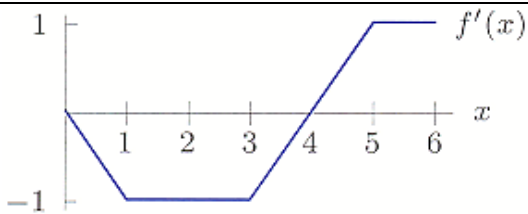


Give the x value where a relative minimum exists on the graph of $f(x)$.

Answer : _____

Round 1 2 3 4 5

#2 Calculus - Hustle
MA@ National Convention 2017

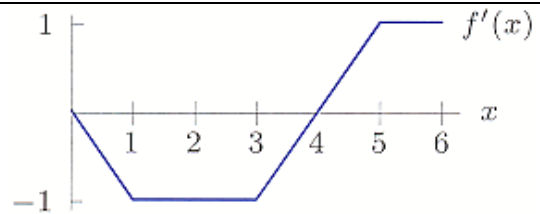


Give the x value where a relative minimum exists on the graph of $f(x)$.

Answer : _____

Round 1 2 3 4 5

#2 Calculus - Hustle
MA@ National Convention 2017



Give the x value where a relative minimum exists on the graph of $f(x)$.

Answer : _____

Round 1 2 3 4 5

#3 Calculus - Hustle
MA@ National Convention 2017

Elapsed Time, x (sec)	Relative Position, y (ft)
0	10
1	8.5
2	7
3	5.5
4	4
5	2.5
6	1

Find the average rate of change of y with respect to x for the interval [2,5] as a decimal.

Answer : _____

Round 1 2 3 4 5

#3 Calculus - Hustle
MA@ National Convention 2017

Elapsed Time, x (sec)	Relative Position, y (ft)
0	10
1	8.5
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3	5.5
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MA@ National Convention 2017

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Find the average rate of change of y with respect to x for the interval [2,5] as a decimal.

Answer : _____

Round 1 2 3 4 5

#4 Calculus - Hustle**MA@ National Convention 2017**

If the average value of $f(x)$ on the interval $[0,2]$ is 0.4; find the value of :

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

Answer : _____

Round 1 2 3 4 5

#4 Calculus - Hustle**MA@ National Convention 2017**

If the average value of $f(x)$ on the interval $[0,2]$ is 0.4; find the value of :

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

Answer : _____

Round 1 2 3 4 5

#4 Calculus - Hustle**MA@ National Convention 2017**

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Answer : _____

Round 1 2 3 4 5

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If the average value of $f(x)$ on the interval $[0,2]$ is 0.4; find the value of :

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

Answer : _____

Round 1 2 3 4 5

#5 Calculus - Hustle
MA@ National Convention 2017

Evaluate: $\int_1^{e^3} \ln x \, dx$

Answer : _____

Round 1 2 3 4 5

#5 Calculus - Hustle
MA@ National Convention 2017

Evaluate: $\int_1^{e^3} \ln x \, dx$

Answer : _____

Round 1 2 3 4 5

#5 Calculus - Hustle
MA@ National Convention 2017

Evaluate: $\int_1^{e^3} \ln x \, dx$

Answer : _____

Round 1 2 3 4 5

#5 Calculus - Hustle
MA@ National Convention 2017

Evaluate: $\int_1^{e^3} \ln x \, dx$

Answer : _____

Round 1 2 3 4 5

#6 Calculus - Hustle
MA@ National Convention 2017

If $\int \frac{3x-4}{(x-3)(x+2)} dx = \ln|f(x)| + C$, where $f(x)$ contains no constant factors other than 1, find $f(x)$ in factored form.

Answer : _____

Round 1 2 3 4 5

#6 Calculus - Hustle
MA@ National Convention 2017

If $\int \frac{3x-4}{(x-3)(x+2)} dx = \ln|f(x)| + C$, where $f(x)$ contains no constant factors other than 1, find $f(x)$ in factored form.

Answer : _____

Round 1 2 3 4 5

#6 Calculus - Hustle
MA@ National Convention 2017

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Answer : _____

Round 1 2 3 4 5

#6 Calculus - Hustle
MA@ National Convention 2017

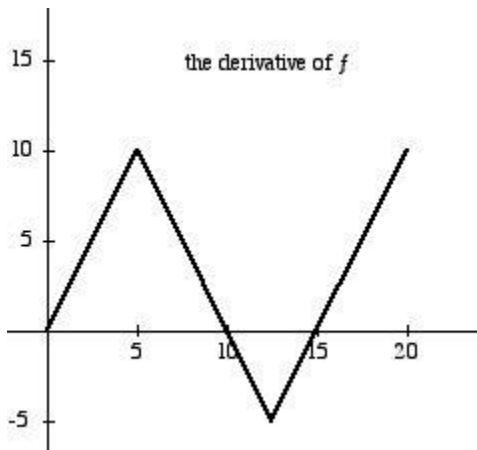
If $\int \frac{3x-4}{(x-3)(x+2)} dx = \ln|f(x)| + C$, where $f(x)$ contains no constant factors other than 1, find $f(x)$ in factored form.

Answer : _____

Round 1 2 3 4 5

#7 Calculus - Hustle
MA@ National Convention 2017

Using the graph of the derivative of f below, find the x values where the graph of f will have a relative maximum.

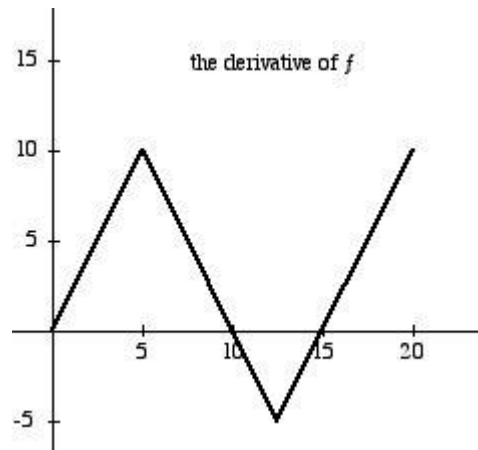


Answer : _____

Round 1 2 3 4 5

#7 Calculus - Hustle
MA@ National Convention 2017

Using the graph of the derivative of f below, find the x values where the graph of f will have a relative maximum.

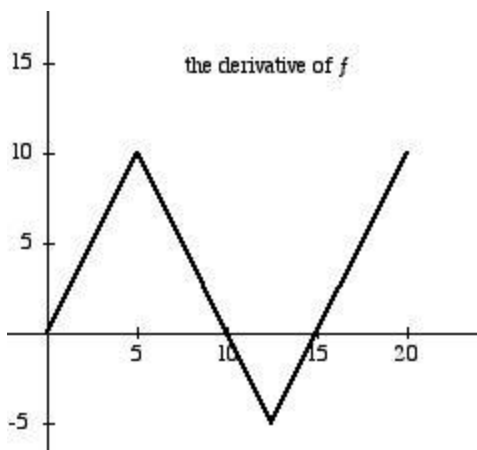


Answer : _____

Round 1 2 3 4 5

#7 Calculus - Hustle
MA@ National Convention 2017

Using the graph of the derivative of f below, find the x values where the graph of f will have a relative maximum.

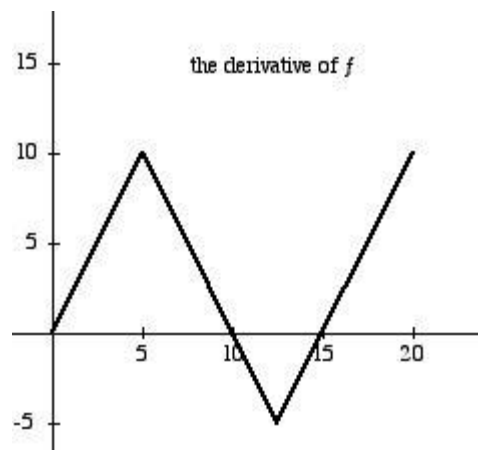


Answer : _____

Round 1 2 3 4 5

#7 Calculus - Hustle
MA@ National Convention 2017

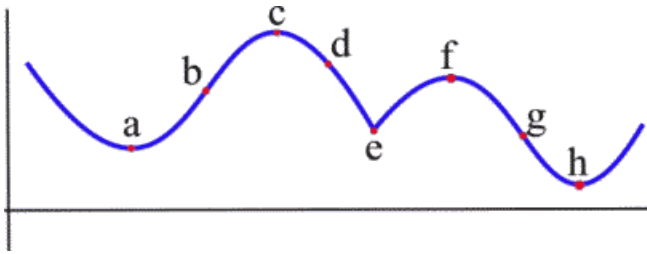
Using the graph of the derivative of f below, find the x values where the graph of f will have a relative maximum.



Answer : _____

Round 1 2 3 4 5

#8 Calculus - Hustle
MA© National Convention 2017

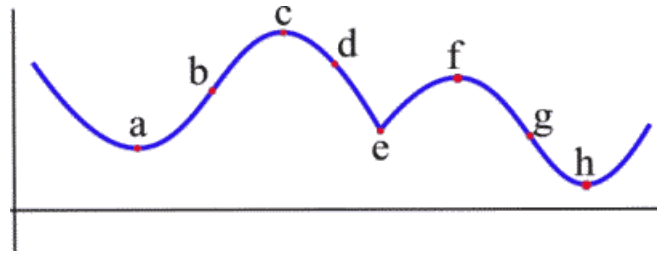


Given the graph above with x-coordinates labeled as letters a-h, find all x coordinates of points of inflection of the given graph.

Answer : _____

Round 1 2 3 4 5

#8 Calculus - Hustle
MA© National Convention 2017

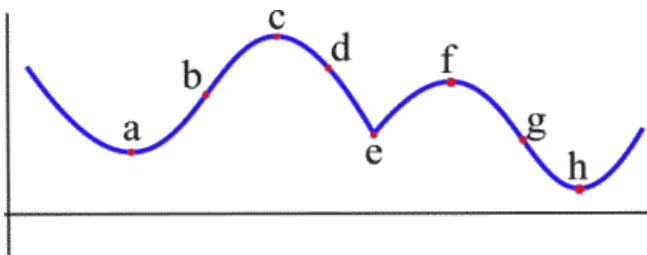


Given the graph above with x-coordinates labeled as letters a-h, find all x coordinates of points of inflection of the given graph.

Answer : _____

Round 1 2 3 4 5

#8 Calculus - Hustle
MA© National Convention 2017

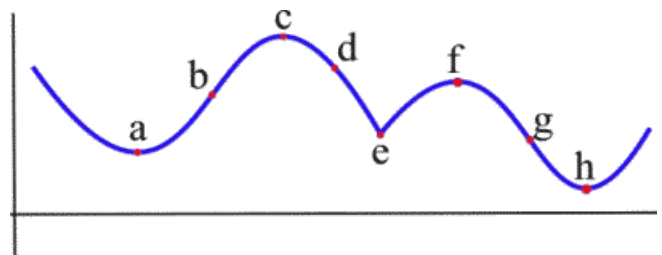


Given the graph above with x-coordinates labeled as letters a-h, find all x coordinates of points of inflection of the given graph.

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Round 1 2 3 4 5

#8 Calculus - Hustle
MA© National Convention 2017



Given the graph above with x-coordinates labeled as letters a-h, find all x coordinates of points of inflection of the given graph.

Answer : _____

Round 1 2 3 4 5

#9 Calculus - Hustle
MA@ National Convention 2017

Evaluate: $\lim_{\theta \rightarrow 0} \frac{\theta^2 + 2\theta}{\sin(2\theta)}$

Answer : _____

Round 1 2 3 4 5

#9 Calculus - Hustle
MA@ National Convention 2017

Evaluate: $\lim_{\theta \rightarrow 0} \frac{\theta^2 + 2\theta}{\sin(2\theta)}$

Answer : _____

Round 1 2 3 4 5

#9 Calculus - Hustle
MA@ National Convention 2017

Evaluate: $\lim_{\theta \rightarrow 0} \frac{\theta^2 + 2\theta}{\sin(2\theta)}$

Answer : _____

Round 1 2 3 4 5

#9 Calculus - Hustle
MA@ National Convention 2017

Evaluate: $\lim_{\theta \rightarrow 0} \frac{\theta^2 + 2\theta}{\sin(2\theta)}$

Answer : _____

Round 1 2 3 4 5

#10 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_1^{\sqrt{3}} \frac{1}{x^2+1} dx$

Answer : _____

Round 1 2 3 4 5

#10 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_1^{\sqrt{3}} \frac{1}{x^2+1} dx$

Answer : _____

Round 1 2 3 4 5

#10 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_1^{\sqrt{3}} \frac{1}{x^2+1} dx$

Answer : _____

Round 1 2 3 4 5

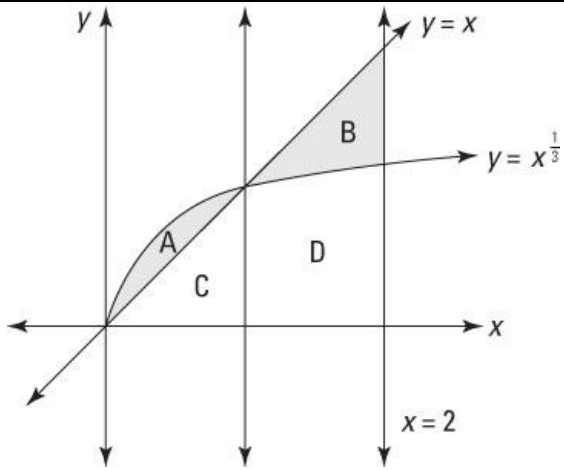
#10 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_1^{\sqrt{3}} \frac{1}{x^2+1} dx$

Answer : _____

Round 1 2 3 4 5

#11 Calculus – Hustle
MA@ National Convention 2017

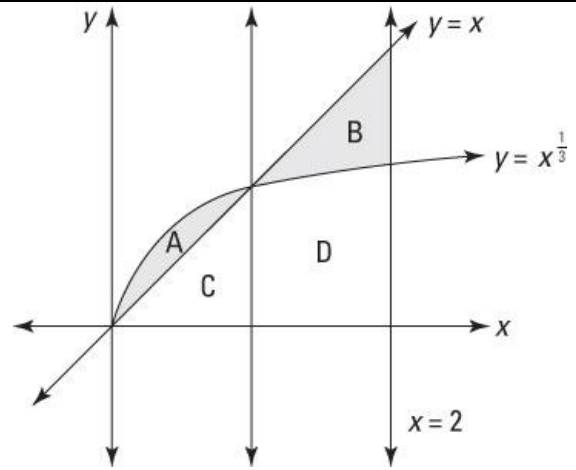


Find the sum of areas A + B, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#11 Calculus – Hustle
MA@ National Convention 2017

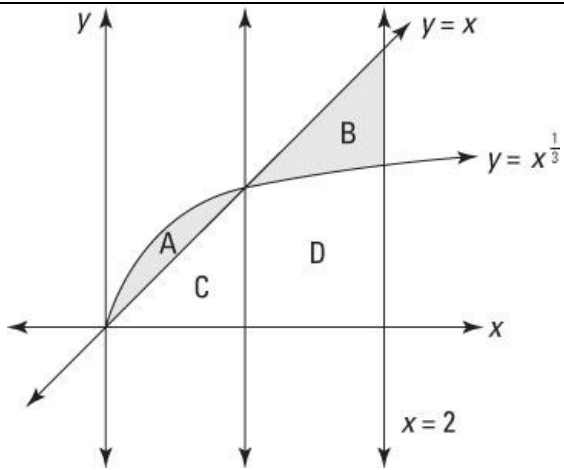


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Round 1 2 3 4 5

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MA@ National Convention 2017

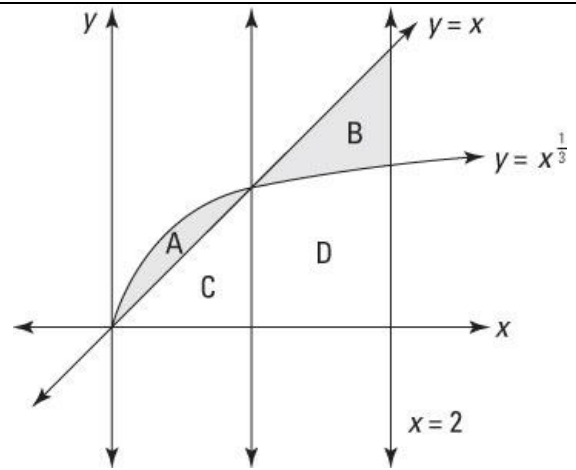


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Round 1 2 3 4 5

#11 Calculus – Hustle
MA@ National Convention 2017

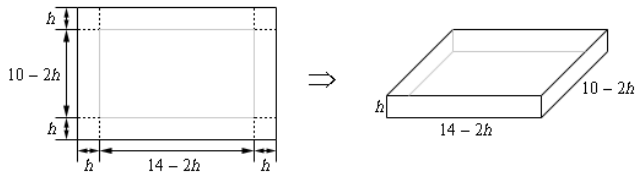


Find the sum of areas A + B, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#12 Calculus – Hustle
MA© National Convention 2017

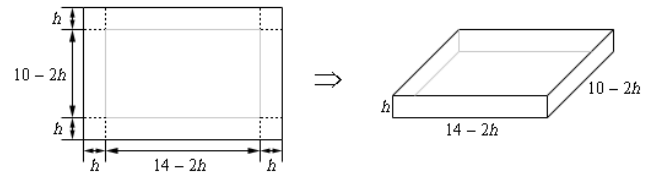


Given the open box formed by cutting the four square corners from the rectangle and folding, find the value of the height of the box that gives a maximum volume, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#12 Calculus – Hustle
MA© National Convention 2017

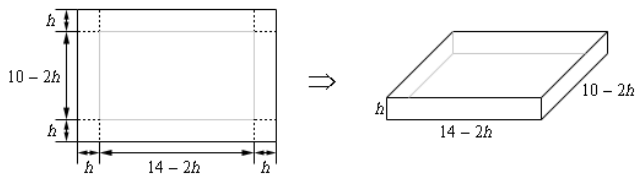


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Answer : _____

Round 1 2 3 4 5

#12 Calculus – Hustle
MA© National Convention 2017

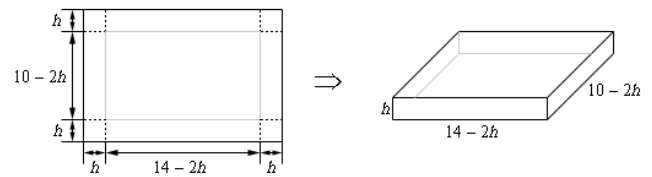


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Round 1 2 3 4 5

#12 Calculus – Hustle
MA© National Convention 2017



Given the open box formed by cutting the four square corners from the rectangle and folding, find the value of the height of the box that gives a maximum volume, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#13 Calculus – Hustle
MA@ National Convention 2017

Find the x-value of the point on the graph of

$y = \frac{6}{x^2 + 3}$ such that the slope of the tangent to the graph at this point is a minimum.

Answer : _____

Round 1 2 3 4 5

#13 Calculus – Hustle
MA@ National Convention 2017

Find the x-value of the point on the graph of

$y = \frac{6}{x^2 + 3}$ such that the slope of the tangent to the graph at this point is a minimum.

Answer : _____

Round 1 2 3 4 5

#13 Calculus – Hustle
MA@ National Convention 2017

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$y = \frac{6}{x^2 + 3}$ such that the slope of the tangent to the graph at this point is a minimum.

Answer : _____

Round 1 2 3 4 5

#13 Calculus – Hustle
MA@ National Convention 2017

Find the x-value of the point on the graph of

$y = \frac{6}{x^2 + 3}$ such that the slope of the tangent to the graph at this point is a minimum.

Answer : _____

Round 1 2 3 4 5

#14 Calculus – Hustle
MA@ National Convention 2017

Find the sum of a and b if

$$f(x) = \begin{cases} ax^2 + b, & x < 2 \\ -8x + a, & x \geq 2 \end{cases}$$

is differentiable over all real numbers.

Answer : _____

Round 1 2 3 4 5

#14 Calculus – Hustle
MA@ National Convention 2017

Find the sum of a and b if

$$f(x) = \begin{cases} ax^2 + b, & x < 2 \\ -8x + a, & x \geq 2 \end{cases}$$

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Answer : _____

Round 1 2 3 4 5

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MA@ National Convention 2017

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is differentiable over all real numbers.

Answer : _____

Round 1 2 3 4 5

#14 Calculus – Hustle
MA@ National Convention 2017

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$$f(x) = \begin{cases} ax^2 + b, & x < 2 \\ -8x + a, & x \geq 2 \end{cases}$$

is differentiable over all real numbers.

Answer : _____

Round 1 2 3 4 5

#15 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_0^{\frac{\pi}{4}} \sec^2 x (1 + \tan x) dx$

Answer : _____

Round 1 2 3 4 5

#15 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_0^{\frac{\pi}{4}} \sec^2 x (1 + \tan x) dx$

Answer : _____

Round 1 2 3 4 5

#15 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_0^{\frac{\pi}{4}} \sec^2 x (1 + \tan x) dx$

Answer : _____

Round 1 2 3 4 5

#15 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_0^{\frac{\pi}{4}} \sec^2 x (1 + \tan x) dx$

Answer : _____

Round 1 2 3 4 5

#16 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_0^{\frac{\pi}{20}} \tan(5x) \cdot \cos(5x) dx$, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#16 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_0^{\frac{\pi}{20}} \tan(5x) \cdot \cos(5x) dx$, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#16 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_0^{\frac{\pi}{20}} \tan(5x) \cdot \cos(5x) dx$, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#16 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\int_0^{\frac{\pi}{20}} \tan(5x) \cdot \cos(5x) dx$, written as a fraction.

Answer : _____

Round 1 2 3 4 5

#17 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\frac{1}{\int_0^{\frac{\pi}{2}} 2^{\sin x} \cos x dx}$

Answer : _____

Round 1 2 3 4 5

#17 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\frac{1}{\int_0^{\frac{\pi}{2}} 2^{\sin x} \cos x dx}$

Answer : _____

Round 1 2 3 4 5

#17 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\frac{1}{\int_0^{\frac{\pi}{2}} 2^{\sin x} \cos x dx}$

Answer : _____

Round 1 2 3 4 5

#17 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\frac{1}{\int_0^{\frac{\pi}{2}} 2^{\sin x} \cos x dx}$

Answer : _____

Round 1 2 3 4 5

#18 Calculus – Hustle
MA@ National Convention 2017

If $f(x) = 2 + |x - 3|$ for all x , then what is the value of $f'(x)$ at $x = 4$?

Answer : _____

Round 1 2 3 4 5

#18 Calculus – Hustle
MA@ National Convention 2017

If $f(x) = 2 + |x - 3|$ for all x , then what is the value of $f'(x)$ at $x = 4$?

Answer : _____

Round 1 2 3 4 5

#18 Calculus – Hustle
MA@ National Convention 2017

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Answer : _____

Round 1 2 3 4 5

#18 Calculus – Hustle
MA@ National Convention 2017

If $f(x) = 2 + |x - 3|$ for all x , then what is the value of $f'(x)$ at $x = 4$?

Answer : _____

Round 1 2 3 4 5

#19 Calculus – Hustle
MA@ National Convention 2017

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

#19 Calculus – Hustle
MA@ National Convention 2017

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

#19 Calculus – Hustle
MA@ National Convention 2017

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

#19 Calculus – Hustle
MA@ National Convention 2017

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

#20 Calculus – Hustle
MA© National Convention 2017

If $\int_0^1 \frac{e^x}{e^{2x} + 3e^x + 2} dx = \ln A$, where A is real, find the value of A , written as an unfactored fraction.

Answer : _____

Round 1 2 3 4 5

#20 Calculus – Hustle
MA© National Convention 2017

If $\int_0^1 \frac{e^x}{e^{2x} + 3e^x + 2} dx = \ln A$, where A is real, find the value of A , written as an unfactored fraction.

Answer : _____

Round 1 2 3 4 5

#20 Calculus – Hustle
MA© National Convention 2017

If $\int_0^1 \frac{e^x}{e^{2x} + 3e^x + 2} dx = \ln A$, where A is real, find the value of A , written as an unfactored fraction.

Answer : _____

Round 1 2 3 4 5

#20 Calculus – Hustle
MA© National Convention 2017

If $\int_0^1 \frac{e^x}{e^{2x} + 3e^x + 2} dx = \ln A$, where A is real, find the value of A , written as an unfactored fraction.

Answer : _____

Round 1 2 3 4 5

#21 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\lim_{x \rightarrow 0} \frac{\sqrt{25-x^2} - 5}{x}$

Answer : _____

Round 1 2 3 4 5

#21 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\lim_{x \rightarrow 0} \frac{\sqrt{25-x^2} - 5}{x}$

Answer : _____

Round 1 2 3 4 5

#21 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\lim_{x \rightarrow 0} \frac{\sqrt{25-x^2} - 5}{x}$

Answer : _____

Round 1 2 3 4 5

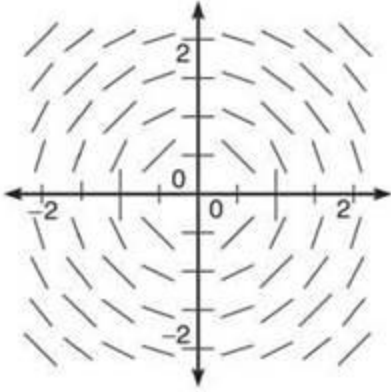
#21 Calculus – Hustle
MA@ National Convention 2017

Evaluate: $\lim_{x \rightarrow 0} \frac{\sqrt{25-x^2} - 5}{x}$

Answer : _____

Round 1 2 3 4 5

#22 Calculus - Hustle
MA@ National Convention 2017

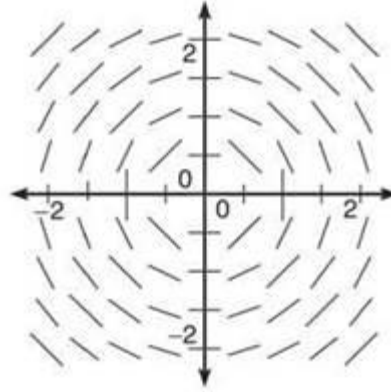


Find the eccentricity of the graph of the solution to the slope field above, given that solution is a conic section.

Answer : _____

Round 1 2 3 4 5

#22 Calculus - Hustle
MA@ National Convention 2017

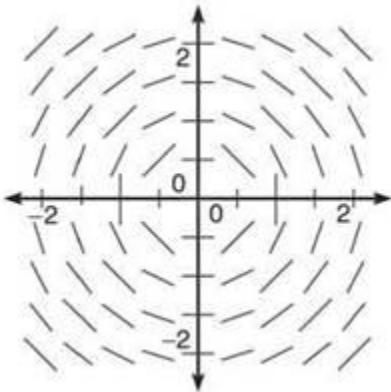


Find the eccentricity of the graph of the solution to the slope field above, given that solution is a conic section.

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Round 1 2 3 4 5

#22 Calculus - Hustle
MA@ National Convention 2017

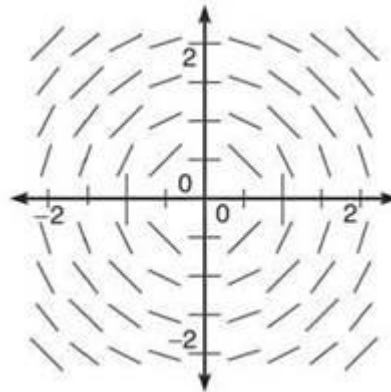


Find the eccentricity of the graph of the solution to the slope field above, given that solution is a conic section.

Answer : _____

Round 1 2 3 4 5

#22 Calculus - Hustle
MA@ National Convention 2017



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Answer : _____

Round 1 2 3 4 5

#23 Calculus - Hustle
MA@ National Convention 2017

Find the value of $f'(7)$, given that

$$f(x) = \ln \frac{(x-1)^2}{(x+2)}.$$

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#24 Calculus – Hustle
MA@ National Convention 2017

If a curve is continuous, crosses the x -axis at two distinct points, and has a tangent at every point between those two x -intercepts, the tangent to the curve at some point between the x -intercepts is parallel to the x -axis.

The theorem above is generally attributed to what mathematician (last name only)?

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#24 Calculus – Hustle
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Round 1 2 3 4 5

#24 Calculus – Hustle
MA@ National Convention 2017

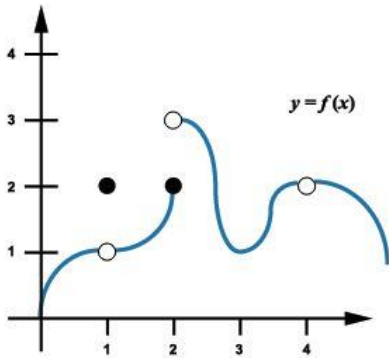
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#25 Calculus – Hustle
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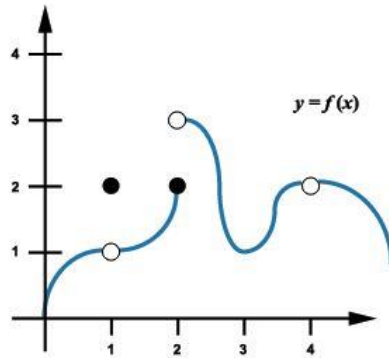


Find the sum of all x values for the graph of y in the interval $[0,5]$ where the graph is not differentiable. The curve does not have a vertical tangent at any point in the diagram.

Answer : _____

Round 1 2 3 4 5

#25 Calculus – Hustle
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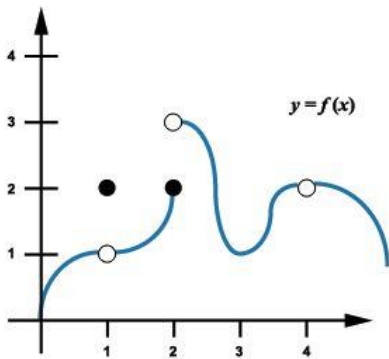


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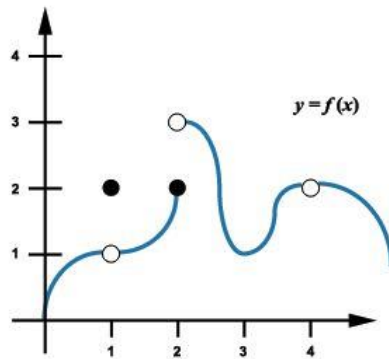


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