#1 Calculus – Hustle MA® National Convention 2017



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

#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

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.

#1 Calculus – Hustle MA© National Convention 2017



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

Answer	:					Answer :							
Round	1	2	3	4	5	Round	1	2	3	4	5		





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





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

Answer : _____

Round 1 2 3 4 5

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).

#2 Calculus – Hustle MA© National Convention 2017



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

Answer :	
----------	--

Answer : _____

Round 1 2 3 4 5

#3 Calculus – Hustle MA© National Convention 2017

Elapsed Time, <i>x</i> (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.

#3 Calculus – Hustle MA© National Convention 2017

Elapsed Time, <i>x</i> (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

Round 1 2 3 4 5

Answer : _____

#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.

#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

Answer : _____

#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 :

 $\int_{0}^{0} f(x) dx$

#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 :

 $\int_{a}^{b} f(x) dx$

Answer : _____

Round 1 2 3 4 5

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 :

 $\int_{a}^{b} f(x) dx$

#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 :

 $\int_{a}^{b} f(x) dx$

Answer : _____

Round 1 2 3 4 5

Answer : _____

#5 Calculus - Hustle MA© National Convention 2017

Evaluate: $\int_{1}^{e^3} \ln x \, dx$

#5 Calculus – Hustle MA© National Convention 2017

Evaluate: $\int_{1}^{e^3} \ln x \, dx$

Answer : _____

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#5 Calculus – Hustle MA© National Convention 2017

Evaluate: $\int_{1}^{e^{3}} \ln x \, dx$

#5 Calculus – Hustle MA© National Convention 2017

Evaluate: $\int_{1}^{e^3} \ln x \, dx$

Answer : _____

Round 1 2 3 4 5

Answer : _____

#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.

#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

Answer : _____

Round 1 2 3 4 5

#6 Calculus – Hustle MA© National Convention 2017

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$$\int \frac{3x-4}{(x-3)(x+2)} dx = \ln |f(x)| + C$$
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#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

Answer : _____

#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.





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.





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.





#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.

#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.

-

Round 1 2 3 4 5

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. #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	:					Answer :							
Round	1	2	3	4	5	Round	1	2	3	4	5		

#9 Calculus – Hustle MA© National Convention 2017

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

#9 Calculus – Hustle MA© National Convention 2017

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

Answer : _____

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#9 Calculus – Hustle MA© National Convention 2017

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

#9 Calculus – Hustle MA© National Convention 2017

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

Answer : _____

Round 1 2 3 4 5

Answer : _____

#10 Calculus – Hustle MA© National Convention 2017

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

#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

Answer : _____

Round 1 2 3 4 5

#10 Calculus – Hustle MA© National Convention 2017

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

#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

Answer : _____

#11 Calculus - Hustle MA© National Convention 2017



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

#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



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



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

Answ	er:					
Roun	d 1	L 2	3	4	5	

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.

#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

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.

#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	:					Answer :						
Round	1	2	3	4	5	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.

#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

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.

#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

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

is differentiable over all real numbers.

#14 Calculus – Hustle MA© National Convention 2017

Find the sum of a and b if

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

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

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

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

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

is differentiable over all real numbers.

Answer : _____

Round 1 2 3 4 5

Answer : _____

#15 Calculus – Hustle MA© National Convention 2017

Evaluate: $\int_{0}^{\frac{\pi}{4}} \sec^{2} x (1 + \tan x) dx$

#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

Answer : _____

Round 1 2 3 4 5

#15 Calculus – Hustle MA© National Convention 2017

Evaluate: $\int_{0}^{\frac{\pi}{4}} \sec^2 x (1 + \tan x) dx$

#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

Answer : _____

#16 Calculus – Hustle MA© National Convention 2017

Evaluate: $\int_{0}^{\frac{\pi}{20}} \tan(5x) \cdot \cos(5x) dx$, written as a fraction.

#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

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.

#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

Answer : _____

#17 Calculus – Hustle MA© National Convention 2017

Evaluate: $\frac{1}{\int_{0}^{\frac{\pi}{2}} 2^{\sin x} \cos x dx}$

#17 Calculus – Hustle MA© National Convention 2017



Answer : _____

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#17 Calculus – Hustle MA® National Convention 2017

Evaluate: $\frac{1}{\int_{0}^{\frac{\pi}{2}} 2^{\sin x} \cos x dx}$

#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

Answer : _____

#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?

#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

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?

#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

Answer : _____

#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.

#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

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.

#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

Answer : _____

#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.

#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 :	_
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Round 1 2 3 4 5

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.

#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

Answer : _____

#21 Calculus - Hustle MA© National Convention 2017

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

#21 Calculus – Hustle MA© National Convention 2017

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

Answer : _____

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#21 Calculus – Hustle MA© National Convention 2017

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

#21 Calculus – Hustle MA© National Convention 2017

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

Answer : _____

Round 1 2 3 4 5

Answer : _____

#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.

#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.

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 :							Answer :						
Round	1	2	3	4	5	Round	1	2	3	4	5		

#23 Calculus – Hustle MA© National Convention 2017

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

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

#23 Calculus – Hustle MA© National Convention 2017

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

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

Answer : _____

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#23 Calculus – Hustle MA© National Convention 2017

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

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

#23 Calculus – Hustle MA© National Convention 2017

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

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

Answer : _____

Answer : _____

Round 1 2 3 4 5

#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)?

#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)?

Answer	:	
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Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#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)?

#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)?

Answer : _____

Round 1 2 3 4 5



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.

#25 Calculus – Hustle MA© National Convention 2017



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.

Round 1 2 3 4 5

#25 Calculus – Hustle MA© National Convention 2017



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 MA© National Convention 2017



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 :						Answer :						
Round	1	2	3	4	5	Round	1	2	3	4	5	