#1 Calculus – Hustle National MAΘ 2008

A particle's position on the x-axis is defined by $x(t) = t^3 - 6t^2 + 9t + 7$. Find the interval(s) that the speed of the particle increasing.

#1 Calculus – Hustle National MAΘ 2008

A particle's position on the x-axis is defined by $x(t) = t^3 - 6t^2 + 9t + 7$. Find the interval(s) that the speed of the particle increasing.

Answer :

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#1 Calculus – Hustle National MAΘ 2008

A particle's position on the x-axis is defined by $x(t) = t^3 - 6t^2 + 9t + 7$. Find the interval(s) that the speed of the particle increasing.

#1 Calculus – Hustle National MAΘ 2008

A particle's position on the x-axis is defined by $x(t) = t^3 - 6t^2 + 9t + 7$. Find the interval(s) that the speed of the particle increasing.

Answer : ______

Answer : _____

Round 1 2 3 4 5

$$\lim_{n\to\infty}\sum_{i=1}^n\left(\frac{3-5i}{n^2}\right)$$

$$\lim_{n\to\infty}\sum_{i=1}^n\left(\frac{3-5i}{n^2}\right)$$

Answer : ______

Answer : _____

Round 1 2 3 4 5

Round 1 2 3 4 5

#2 Calculus – Hustle National MAΘ 2008 #2 Calculus – Hustle National MAΘ 2008

$$\lim_{n\to\infty}\sum_{i=1}^n\left(\frac{3-5i}{n^2}\right)$$

$$\lim_{n\to\infty}\sum_{i=1}^n\left(\frac{3-5i}{n^2}\right)$$

Answer : ______

Answer : _____

Round 1 2 3 4 5

$$\int \frac{x^3}{x^2 - 1} dx$$

$$\int \frac{x^3}{x^2 - 1} dx$$

Answer : _____

Answer : _____

Round 1 2 3 4 5

Round 1 2 3 4 5

#3 Calculus – Hustle National MAΘ 2008 #3 Calculus – Hustle National MAΘ 2008

$$\int \frac{x^3}{x^2 - 1} dx$$

$$\int \frac{x^3}{x^2 - 1} dx$$

Answer : _____

Answer : _____

Round 1 2 3 4 5

#4 Calculus – Hustle National MAΘ 2008

#4 Calculus – Hustle National MA⊕ 2008

Given
$$f(x) = 2^{x^3}$$

Given
$$f(x) = 2^{x^3}$$

Find
$$f'(x)$$

Find
$$f'(x)$$

Answer : ______

Answer : ______

Round 1 2 3 4 5

Round 1 2 3 4 5

#4 Calculus – Hustle National MAΘ 2008

#4 Calculus – Hustle National MAΘ 2008

Given
$$f(x) = 2^{x^3}$$

Given
$$f(x) = 2^{x^3}$$

Find f'(x)

Find f'(x)

Answer : _____

Answer : _____

Round 1 2 3 4 5

Given

$$x(t) = e^{\pi t}$$
 and $y(t) = \cos(\pi t)$

Find
$$\frac{d^2y}{dx^2}$$
 at $t = \frac{1}{2}$

$$x(t) = e^{\pi t}$$
 and $y(t) = \cos(\pi t)$

Find
$$\frac{d^2y}{dx^2}$$
 at $t = \frac{1}{2}$

Answer : _____

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#5 Calculus – Hustle National MAΘ 2008

Given

$$x(t) = e^{\pi t}$$
 and $y(t) = \cos(\pi t)$

Find
$$\frac{d^2y}{dx^2}$$
 at $t = \frac{1}{2}$

#5 Calculus – Hustle National MAΘ 2008

Given

$$x(t) = e^{\pi t}$$
 and $y(t) = \cos(\pi t)$

Find
$$\frac{d^2y}{dx^2}$$
 at $t = \frac{1}{2}$

Answer : _____

Answer : _____

Round 1 2 3 4 5

Given
$$F(x) = \int_{-x^2}^{1} e^{t^3} dt$$

Given
$$F(x) = \int_{-x^2}^{1} e^{t^3} dt$$

Find F'(x)

Find F'(x)

Answer : _____

Answer : _____

Round 1 2 3 4 5

Round 1 2 3 4 5

#6 Calculus – Hustle National MA⊕ 2008

#6 Calculus – Hustle MA® National Convention 2007

Given
$$F(x) = \int_{-x^2}^{1} e^{t^3} dt$$

Given
$$F(x) = \int_{-x^2}^{1} e^{t^3} dt$$

Find F'(x)

Find F'(x)

Answer : ______

Answer : _____

Round 1 2 3 4 5

#7 Calculus – Hustle National MAΘ 2008

What is the linear approximation of $\sqrt{50}$ given $\sqrt{49} = 7$?

#7 Calculus – Hustle National MAΘ 2008

What is the linear approximation of $\sqrt{50}$ given $\sqrt{49} = 7$?

Answer : _____

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#7 Calculus – Hustle National MAΘ 2008

What is the linear approximation of $\sqrt{50}$ given $\sqrt{49} = 7$?

#7 Calculus – Hustle National MAΘ 2008

What is the linear approximation of $\sqrt{50}$ given $\sqrt{49} = 7$?

Answer : _____

Answer : _____

Round 1 2 3 4 5

#8 Calculus – Hustle National MA© 2008

Evaluate:

$$\int_{0}^{\ln\sqrt{3}} \frac{e^x}{\sqrt{4 - e^{2x}}} dx$$

#8 Calculus – Hustle National MAΘ 2008

Evaluate:

$$\int_{0}^{\ln\sqrt{3}} \frac{e^x}{\sqrt{4 - e^{2x}}} dx$$

Answer : ______

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#8 Calculus – Hustle National MAΘ 2008

Evaluate:

$$\int_{0}^{\ln\sqrt{3}} \frac{e^x}{\sqrt{4-e^{2x}}} dx$$

#8 Calculus – Hustle National MAΘ 2008

Evaluate:

$$\int_{0}^{\ln\sqrt{3}} \frac{e^{x}}{\sqrt{4-e^{2x}}} dx$$

Answer : _____

Answer : _____

Round 1 2 3 4 5

#9 Calculus – Hustle National MAΘ 2008

Find the volume of the solid formed when the graph $9x^2 + 4y^2 - 36x + 56y + 196 = 0$ is revolved about the x-axis.

#9 Calculus – Hustle National MAΘ 2008

Find the volume of the solid formed when the graph $9x^2 + 4y^2 - 36x + 56y + 196 = 0$ is revolved about the x-axis.

Answer	•	
AIISWCI	•	

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#9 Calculus – Hustle National MAΘ 2008

Find the volume of the solid formed when the graph $9x^2 + 4y^2 - 36x + 56y + 196 = 0$ is revolved about the x-axis.

#9 Calculus – Hustle National MAΘ 2008

Find the volume of the solid formed when the graph $9x^2 + 4y^2 - 36x + 56y + 196 = 0$ is revolved about the x-axis.

Answer : _____

Answer : _____

Round 1 2 3 4 5

#10 Calculus – Hustle National MA_O 2008

Evaluate:

$$\lim_{x\to 0} \left(1 + \frac{1}{3x}\right)^{3x}$$

#10 Calculus – Hustle National MA_O 2008

Evaluate:

$$\lim_{x\to 0} \left(1 + \frac{1}{3x}\right)^{3x}$$

Answer : _____

Answer : _____

Round 1 2 3 4 5

#10 Calculus – Hustle National MA_O 2008

Evaluate:

$$\lim_{x\to 0} \left(1 + \frac{1}{3x}\right)^{3x}$$

#10 Calculus – Hustle **MAO** National Convention 2007

Evaluate:

$$\lim_{x\to 0} \left(1 + \frac{1}{3x}\right)^{3x}$$

Answer : _____

Answer : _____

Round 1 2 3 4 5

#11 Calculus – Hustle National MAΘ 2008

Find the slope of the line normal to the curve $x^2y + 3xy^2 = 2$ in quadrant IV when x = 1.

#11 Calculus – Hustle National MAΘ 2008

Find the slope of the line normal to the curve $x^2y + 3xy^2 = 2$ in quadrant IV when x = 1.

Answer	•			
AIISWCI	•			

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#11 Calculus – Hustle National MA© 2008

Find the slope of the line normal to the curve $x^2y + 3xy^2 = 2$ in quadrant IV when x = 1.

#11 Calculus – Hustle National MA© 2008

Find the slope of the line normal to the curve $x^2y + 3xy^2 = 2$ in quadrant IV when x = 1.

Answer : ______

Answer : _____

Round 1 2 3 4 5

#12 Calculus – Hustle National MAΘ 2008

Find the rate of change of the volume of a cube in $\frac{cm^3}{\sec}$ that has surface area changing at a rate of $4\frac{cm^2}{\sec}$ when the volume of the cube is $8\frac{cm^3}{\sec}$.

#12 Calculus – Hustle National MAΘ 2008

Find the rate of change of the volume of a cube in $\frac{cm^3}{\sec}$ that has surface area changing at a rate of $4\frac{cm^2}{\sec}$ when the volume of the cube is $8\frac{cm^3}{\sec}$.

Answer	•	
AIISWCI	•	

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#12 Calculus – Hustle National MAΘ 2008

Find the rate of change of the volume of a cube in $\frac{cm^3}{\sec}$ that has surface area changing at a rate of $4 \frac{cm^2}{\sec}$ when the volume of the cube is $8 \frac{cm^3}{\sec}$.

#12 Calculus – Hustle National MAΘ 2008

Find the rate of change of the volume of a cube in $\frac{cm^3}{\sec}$ that has surface area changing at a rate of $4 \frac{cm^2}{\sec}$ when the volume of the cube is $8 \frac{cm^3}{\sec}$.

Answer : _____

Round 1 2 3 4 5

Answer : _____

Given
$$f(x) = \sqrt{x + 3\sqrt{x + 3\sqrt{x + 3...}}}$$

Given
$$f(x) = \sqrt{x + 3\sqrt{x + 3\sqrt{x + 3\dots}}}$$

Find f'(4)

Find f'(4)

Answer : _____

Answer : _____

Round 1 2 3 4 5

Round 1 2 3 4 5

#13 Calculus – Hustle National MA⊕ 2008 #13 Calculus – Hustle National MA⊕ 2008

Given
$$f(x) = \sqrt{x + 3\sqrt{x + 3\sqrt{x + 3...}}}$$

Given
$$f(x) = \sqrt{x + 3\sqrt{x + 3\sqrt{x + 3...}}}$$

Find f'(4)

Find f'(4)

Answer : ______

Answer : _____

Round 1 2 3 4 5

#14 Calculus – Hustle National MA© 2008

Find the interval of convergence of

$$\sum_{n=0}^{\infty} \frac{(x-2)^{n+1}}{(n+1)4^{n+1}}$$

#14 Calculus – Hustle National MAΘ 2008

Find the interval of convergence of

$$\sum_{n=0}^{\infty} \frac{\left(x-2\right)^{n+1}}{\left(n+1\right)4^{n+1}}$$

_			
Answer	•		
AIISWCI	•		

Round 1 2 3 4 5

#14 Calculus – Hustle National MAΘ 2008

Find the interval of convergence of

$$\sum_{n=0}^{\infty} \frac{(x-2)^{n+1}}{(n+1)4^{n+1}}$$

#14 Calculus – Hustle National MAΘ 2008

Find the interval of convergence of

$$\sum_{n=0}^{\infty} \frac{\left(x-2\right)^{n+1}}{\left(n+1\right)4^{n+1}}$$

Answer : ______

Answer : _____

Round 1 2 3 4 5

#15 Calculus – Hustle National MAΘ 2008

#15 Calculus – Hustle National MA© 2008

If
$$f(x) = \left(\frac{2}{x} + x^2\right)^9$$
, find the coefficient of the x^5 term of $f'(x)$.

If $f(x) = \left(\frac{2}{x} + x^2\right)^9$, find the coefficient of the x^5 term of f'(x).

Answer : _____

Answer : _____

Round 1 2 3 4 5

Round 1 2 3 4 5

#15 Calculus – Hustle National MAΘ 2008

#15 Calculus – Hustle National MAΘ 2008

If $f(x) = \left(\frac{2}{x} + x^2\right)^9$, find the coefficient of the x^5 term of f'(x).

If $f(x) = \left(\frac{2}{x} + x^2\right)^9$, find the coefficient of the x^5 term of f'(x).

Answer : ______

Answer : _____

Round 1 2 3 4 5

#16 Calculus – Hustle National MAΘ 2008

Find the particular solution, y = f(x), to the differential equation $\frac{dy}{dx} = \frac{y(x+2)}{x}$ given y(1) = 2e.

#16 Calculus – Hustle National MAΘ 2008

Find the particular solution, y = f(x), to the differential equation $\frac{dy}{dx} = \frac{y(x+2)}{x}$ given y(1) = 2e.

A	_	
Answer	•	
	•	

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#16 Calculus – Hustle National MAΘ 2008

Find the particular solution, y = f(x), to the differential equation $\frac{dy}{dx} = \frac{y(x+2)}{x}$ given y(1) = 2e.

#16 Calculus – Hustle National MAΘ 2008

Find the particular solution, y = f(x), to the differential equation $\frac{dy}{dx} = \frac{y(x+2)}{x}$ given y(1) = 2e.

Answer : _____

Round 1 2 3 4 5

Answer : _____

#17 Calculus – Hustle National MAΘ 2008

#17 Calculus – Hustle National MA© 2008

If
$$f(x) = \tan x, -\frac{\pi}{2} < x < \frac{\pi}{2}$$
 and $f^{-1}(x) = g(x)$, find $g'(\sqrt{3})$.

If
$$f(x) = \tan x, -\frac{\pi}{2} < x < \frac{\pi}{2}$$
 and $f^{-1}(x) = g(x)$, find $g'(\sqrt{3})$.

Answer : _____

Answer : ______

Round 1 2 3 4 5

Round 1 2 3 4 5

#17 Calculus – Hustle National MAΘ 2008

#17 Calculus – Hustle National MAΘ 2008

If
$$f(x) = \tan x, -\frac{\pi}{2} < x < \frac{\pi}{2}$$
 and $f^{-1}(x) = g(x)$, find $g'(\sqrt{3})$.

If
$$f(x) = \tan x, -\frac{\pi}{2} < x < \frac{\pi}{2}$$
 and $f^{-1}(x) = g(x)$, find $g'(\sqrt{3})$.

Answer : ______

Answer : _____

Round 1 2 3 4 5

#18 Calculus – Hustle National MAΘ 2008

#18 Calculus – Hustle National MAΘ 2008

Find the absolute maximum value of the function $f(x) = 3x^5 - 5x^3 - 1$ on the interval [-2, 2]

Find the absolute maximum value of the function $f(x) = 3x^5 - 5x^3 - 1$ on the interval [-2,2]

Answer : _____

Answer : _____

Round 1 2 3 4 5

Round 1 2 3 4 5

#18 Calculus – Hustle National MAΘ 2008

#18 Calculus – Hustle National MA⊕ 2008

Find the absolute maximum value of the function $f(x) = 3x^5 - 5x^3 - 1$ on the interval [-2,2]

Find the absolute maximum value of the function $f(x) = 3x^5 - 5x^3 - 1$ on the interval [-2, 2]

Answer : _____

Answer : _____

Round 1 2 3 4 5

#19 Calculus - Hustle
National MA© 2008

#19 Calculus – Hustle National MAΘ 2008

Find the area of ONE petal of the polar graph $r = 2\cos(3\theta)$

Find the area of ONE petal of the polar graph $r = 2\cos(3\theta)$

Answer : _____

Answer : _____

Round 1 2 3 4 5

Round 1 2 3 4 5

#19 Calculus – Hustle National MAΘ 2008 #19 Calculus – Hustle National MAΘ 2008

Find the area of ONE petal of the polar graph $r = 2\cos(3\theta)$

Find the area of ONE petal of the polar graph $r = 2\cos(3\theta)$

Answer : _____

Answer : _____

Round 1 2 3 4 5

#20 Calculus – Hustle National MAΘ 2008

Find the volume of the solid formed by revolving the region bounded by $y = x^2$, y = x + 3 and x = 0, revolved about the x-axis.

#20 Calculus – Hustle National MAΘ 2008

Find the volume of the solid formed by revolving the region bounded by $y = x^2$, y = x + 3 and x = 0, revolved about the x-axis.

Answer : _____

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#20 Calculus – Hustle National MAΘ 2008

Find the volume of the solid formed by revolving the region bounded by $y = x^2$, y = x + 3 and x = 0, revolved about the x-axis.

#20 Calculus – Hustle National MA⊕ 2008

Find the volume of the solid formed by revolving the region bounded by $y = x^2$, y = x + 3 and x = 0, revolved about the x-axis.

Answer : ______

Answer : _____

Round 1 2 3 4 5

#21 Calculus – Hustle National MAΘ 2008

The equation of an ellipse is given by $(x^2)^2 + (x^2)^2$

$$\frac{\left(x-2\right)^2}{a^2} + \frac{\left(y+4\right)^2}{b^2} = 1$$
. Find the rate of change

in the area of the ellipse in $\frac{units}{\sec^2}$ if the minor axis is decreasing at a rate of 0.4 $\frac{units}{\sec}$ and the major axis is increasing at a rate of 0.6 $\frac{units}{\sec}$ and the major axis has length 10 units and minor axis has length 6 units.

Answer : ______

Round 1 2 3 4 5

#21 Calculus – Hustle National MAΘ 2008

The equation of an ellipse is given by $\frac{(x-2)^2}{a^2} + \frac{(y+4)^2}{b^2} = 1$. Find the rate of change in the area of the ellipse in $\frac{units}{\sec^2}$ if the minor axis is decreasing at a rate of 0.4 $\frac{units}{\sec}$ and the major axis is increasing at a rate of 0.6 $\frac{units}{\sec}$ and the major axis has length 10 units

Answer:

and minor axis has length 6 units.

Round 1 2 3 4 5

#21 Calculus – Hustle National MAΘ 2008

The equation of an ellipse is given by

$$\frac{\left(x-2\right)^2}{a^2} + \frac{\left(y+4\right)^2}{b^2} = 1$$
. Find the rate of change

in the area of the ellipse in $\frac{units}{\sec^2}$ if the minor axis is decreasing at a rate of 0.4 $\frac{units}{\sec}$ and the major axis is increasing at a rate of 0.6 $\frac{units}{\sec}$ and the major axis has length 10 units and minor axis has length 6 units.

Answer:

Round 1 2 3 4 5

#21 Calculus – Hustle National MAΘ 2008

The equation of an ellipse is given by $\frac{(x-2)^2}{a^2} + \frac{(y+4)^2}{b^2} = 1.$ Find the rate of change

in the area of the ellipse in $\frac{units}{\sec^2}$ if the minor axis is decreasing at a rate of 0.4 $\frac{units}{\sec}$ and the major axis is increasing at a rate of 0.6 $\frac{units}{\sec}$ and the major axis has length 10 units and minor axis has length 6 units.

Answer : _____

If
$$y = \ln \sqrt[3]{x^6 \sin(3x)}$$
, find $\frac{dy}{dx}$.

If
$$y = \ln \sqrt[3]{x^6 \sin(3x)}$$
, find $\frac{dy}{dx}$.

Answer : ______

Answer : _____

Round 1 2 3 4 5

Round 1 2 3 4 5

#22 Calculus – Hustle National MAΘ 2008 #22 Calculus – Hustle National MAΘ 2008

If
$$y = \ln \sqrt[3]{x^6 \sin(3x)}$$
, find $\frac{dy}{dx}$.

If
$$y = \ln \sqrt[3]{x^6 \sin(3x)}$$
, find $\frac{dy}{dx}$.

Answer : _____

Answer : _____

Round 1 2 3 4 5

#23 Calculus – Hustle National MA© 2008

Find the sum of the values for x that satisfy the Mean Value Theorem for Integrals for the function $f(x) = (x-1)^2$ over the interval [4,7]

#23 Calculus – Hustle National MAΘ 2008

Find the sum of the values for x that satisfy the Mean Value Theorem for Integrals for the function $f(x) = (x-1)^2$ over the interval [4,7]

Answer	•	
AllSWCI	•	

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#23 Calculus – Hustle National MA⊕ 2008

Find the sum of the values for x that satisfy the Mean Value Theorem for Integrals for the function $f(x) = (x-1)^2$ over the interval [4,7]

#23 Calculus – Hustle National MAΘ 2008

Find the sum of the values for x that satisfy the Mean Value Theorem for Integrals for the function $f(x) = (x-1)^2$ over the interval [4,7]

Answer : ______

Round 1 2 3 4 5

Answer : ______

#24 Calculus – Hustle National MAΘ 2008

Find the coefficient of the x^6 term of the Taylor expansion of $f(x) = \cos x$ centered about $x = \frac{\pi}{6}$.

#24 Calculus – Hustle National MA© 2008

Find the coefficient of the x^6 term of the Taylor expansion of $f(x) = \cos x$ centered about $x = \frac{\pi}{6}$.

Answer	•		
AHSWCI	•		

Round 1 2 3 4 5

Answer : _____

Round 1 2 3 4 5

#24 Calculus – Hustle National MAΘ 2008

Find the coefficient of the x^6 term of the Taylor expansion of $f(x) = \cos x$ centered about $x = \frac{\pi}{6}$.

#24 Calculus – Hustle National MAΘ 2008

Find the coefficient of the x^6 term of the Taylor expansion of $f(x) = \cos x$ centered about $x = \frac{\pi}{6}$.

Answer : _____

Answer : _____

Round 1 2 3 4 5

If
$$f\left(\frac{3}{x}\right) = x^2 - 3x$$
, find $\frac{d[f(x)]}{d(2\ln x)}$.

If
$$f\left(\frac{3}{x}\right) = x^2 - 3x$$
, find $\frac{d\left[f(x)\right]}{d(2\ln x)}$.

Answer : ______

Answer : ______

Round 1 2 3 4 5

Round 1 2 3 4 5

#25 Calculus – Hustle National MAΘ 2008 #25 Calculus – Hustle National MAΘ 2008

If
$$f\left(\frac{3}{x}\right) = x^2 - 3x$$
, find $\frac{d[f(x)]}{d(2\ln x)}$.

If
$$f\left(\frac{3}{x}\right) = x^2 - 3x$$
, find $\frac{d\left[f(x)\right]}{d(2\ln x)}$.

Answer : _____

Answer : _____

Round 1 2 3 4 5