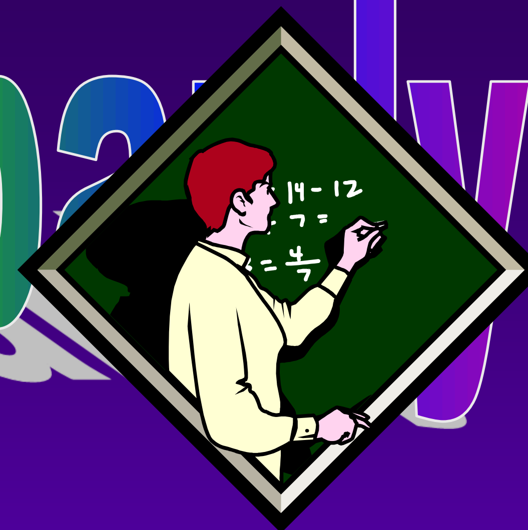
Math Jeopardy



BC Calculus

Review

Final Jeopardy

Math Jeopardy

Convergence Tests	Parametric	Taylor/ Maclaurin Series	Polar	AB Obscurities	Easy AB Stuff
$100	$100	$100	$100	$100	$100
$200	$200	$200	$200	$200	$200
$300	$300	$300	$300	$300	$300
$400	$400	$400	$400	$400	$400
$500	$500	$500	$500	$500	$500

Cat1Help

Text Object.

Math Type Object

Double Click to Edit

Cat2Help

Text Object.

Math Type Object

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Cat3Help

Text Object.

Math Type Object

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Cat4Help

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Math Type Object

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Cat5Help

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Math Type Object

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Cat6Help

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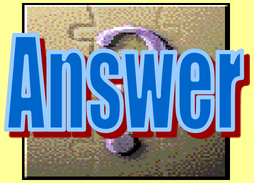
Math Type Object

Double Click to Edit

$100

$$\sum_{n=1}^{\infty} \frac{1}{n^2 + n}$$



$$\sum_{n=1}^{\infty} \frac{1}{n^2+n}$$

$100

1

Back to Problem

Back to Gameboard

$200

Which of these converge?

$$I.\ \sum_{n=1}^{\infty}(-1)^{n+1}\frac{1}{3n+1}$$

$$II.\ \sum_{n=1}^{\infty}\frac{1}{n}\left(\frac{4}{3}\right)^{n}$$

$$III.\ \sum_{n=4}^{\infty}\frac{1}{n\ln n}$$

Back to Gameboard

Answer

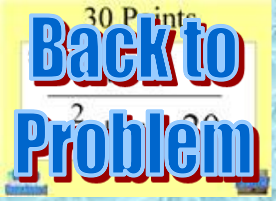
$200

$$I. \sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{3n+1}$$

$$II. \sum_{n=1}^{\infty} \frac{1}{n}\left(\frac{4}{3}\right)^{n}$$

$$III. \sum_{n=4}^{\infty} \frac{1}{n \ln n}$$

I only

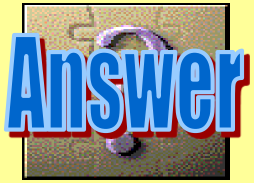


$300

Perform the ratio test to decide whether...

$$\sum_{n=1}^{\infty} \frac{2 \bullet 4 \bullet 6 \bullet ...(2n)}{n!}$$

converges, diverges, or is inconclusive.



$$\sum_{n=1}^{\infty} \frac{2 \bullet 4 \bullet 6 \bullet \ldots (2n)}{n!}$$

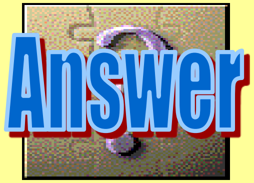
$300

Diverges

$400

What is the sum of the infinite geometric series

$$\frac{2}{3} + \frac{4}{27} + \frac{8}{243} + \ldots ?$$



$$\frac{2}{3}+\frac{4}{27}+\frac{8}{243}+\ldots?$$

$400

$$\frac{6}{7}$$

Back to Problem

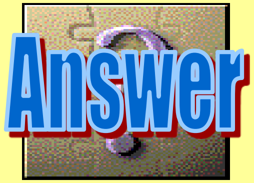
Back to Gameboard

$500

Let a_n, b_n, c_n be sequences of positive numbers such that for all integers n, $a_n \le b_n \le c_n$. If $\sum_{n=1}^{\infty} b_n$ converges, which must be true?

$$I.\ \sum_{n=1}^{\infty} a_n \text{ converges} \quad II.\ \sum_{n=1}^{\infty} c_n \text{ converges}$$

$$III.\ \sum_{n=1}^{\infty} (a_n + b_n) \text{ converges}$$



$500

$$I.\ \sum_{n=1}^{\infty} a_n \text{ converges} \quad II.\ \sum_{n=1}^{\infty} c_n \text{ converges}$$

$$III.\ \sum_{n=1}^{\infty} (a_n + b_n) \text{ converges}$$

I and III only

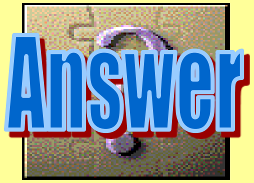
Back to Problem

Back to Gameboard

$100

If $x = 2t^2$ and $y = t^3$, then $\dfrac{d^2y}{dx^2}$

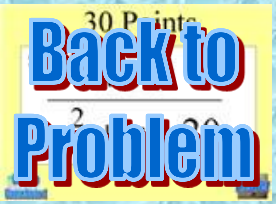
at $t = 3$ is



If $x = 2t^2$ and $y = t^3$, then $\dfrac{d^2y}{dx^2}$ at $t = 3$ is

$100

$$\frac{1}{16}$$



$200

The velocity vector of a particle moving in the xy-plane is given by $\vec{v} = (2\sin t, 3\cos t)$ for $t \geq 0$. At $t = 0$, the particle is at the point (1,1). What is the position vector at $t = 2$?

Calc. Active

Back to Gameboard

Answer

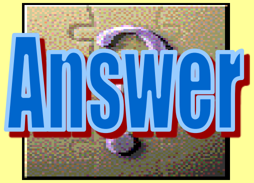
The velocity vector of a particle moving in the xy – plane is given by $\vec{v} = (2\sin t, 3\cos t)$ for $t \geq 0$. At $t = 0$, the particle is at the point (1,1). What is the position vector at $t = 2$?

$200

$$(3.832, 3.728)$$

$300

(Non-Calc) A curve is given parametrically by the equations $x = 3t - t^3$ and $y = 3t^2$. The length of the arc from $t = 0$ to $t = 2$ is



$300

(Non-Calc) A curve is given parametrically by the equations $x = 3t - t^3$ and $y = 3t^2$. The length of the arc from $t = 0$ to $t = 2$ is

14

Back to Problem

Back to Gameboard

$400

A curve is given parametrically by the equation $x = 3 - 4\sin t$ and $y = 4 + \cos t$ for $0 \le t \le 2\pi$. What are all points (x, y) at which the curve has a vertical tangent?

(A) (-1,4) only

(B) (3,7)

(C) (-1,4) and (7,4)

(D) (3,7) and (3,1)

(E) (4,-1) and (4,7)

Back to Gameboard

Answer

$400

A curve is given parametrically by the equation $x = 3 - 4\sin t$ and $y = 4 + \cos t$ for $0 \le t \le 2\pi$. What are all points (x, y) at which the curve has a vertical tangent?

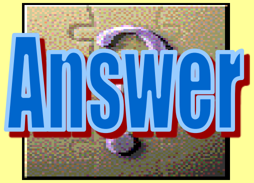
(C) (-1,4) and (7,4)

Back to Problem

Back to Gameboard

$500

The rectangular equation of the curve given parametrically by $x = 1 + e^{-t}$ and $y = 1 + e^{t}$ is



The rectangular equation of the curve given parametrically by $x = 1 + e^{-t}$ and $y = 1 + e^{t}$ is

$500

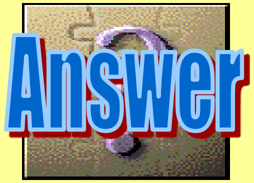
$$y = \frac{x}{x-1} \quad or \quad y = 1 + \frac{1}{x-1}$$

Back to Problem

Back to Gameboard

$100

The Maclaurin series expansion of $\frac{x^3}{1+x^2}$ is



$100

$$\frac{x^3}{1+x^2}$$

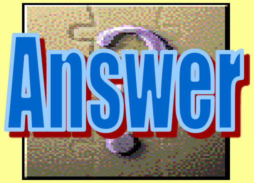
$$x^3 - x^5 + x^7 - x^9 + \ldots$$

Back to Problem

Back to Gameboard

$200

The coefficent of x^6 in the Taylor series expansion of e^x about $x = 0$ is



$200

e^x

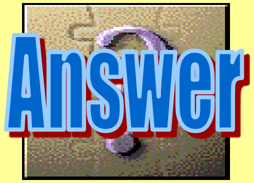
$$\frac{1}{6!}$$

Back to Problem

Back to Gameboard

$300

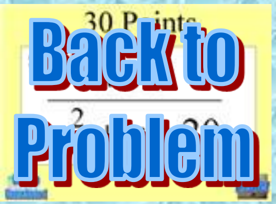
What value is obtained when using the fourth-degree Taylor polynomial for $\cos x$ about $x = 0$ to approximate cos 1? Write out your answer (no calc)



What value is obtained when using the fourth-degree Taylor polynomial for $\cos x$ about $x = 0$ to approximate cos 1?

$300

$$1 - \frac{1}{2} + \frac{1}{24}$$



$400

$P(x) = x - \frac{1}{6}x^3$ is the third order Taylor polynomial for $\sin x$ about $x = 0$. Use L'Grange Error Formula to find the maximum value of $\left|\text{P(x)-}\sin x\right|$ for

$0 \le x \le \frac{\pi}{3}$ is

Back to Gameboard

Answer

$P(x) = x - \frac{1}{6}x^3$ is the third order Taylor polynomial for $\sin x$ about $x = 0$. The maximum value of $|P(x) - \sin x|$ for $0 \le x \le \frac{\pi}{3}$ is

$400

0.043

Back to Problem

Back to Gameboard

$500

The Taylor series centerd at $x = 2$ for the function g is given by $\sum_{\text{n}=0}^{\infty} \frac{(\text{-}1)^{\text{n}} (x-2)^n}{(n+1)!}$.

What is $g^{(20)}(2)$, the 20th derivative of g at $x = 2$?

Back to Gameboard

Answer

The Taylor series centerd at $x = 2$ for the function g is given by $\sum_{n=0}^{\infty} \frac{(-1)^n (x-2)^n}{(n+1)!}$.

What is $g^{(20)}(2)$, the 20th derivative of g at $x = 2$?

$500

$$\frac{1}{21}$$

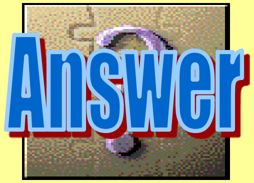
Back to Problem

Back to Gameboard

$100

Convert to Cartesian:

$$r\sin\theta = 0$$



Convert to Cartesian: $100

$r\sin\theta = 0$

$$y = 0$$

Back to Problem

Back to Gameboard

$200

(Calc) The area enclosed by the polar curve $r = 6\cos\theta + 8\sin\theta$ from $\theta = 0$ to $\theta = \pi$ is

Back to Gameboard

Answer

(Calc) The area enclosed by the polar curve $r = 6\cos\theta + 8\sin\theta$ from $\theta = 0$ to $\theta = \pi$ is

$200

$$25\pi$$

Back to Problem

Back to Gameboard

$300

If the function $r = f(\theta)$ is continuous and nonnegative for $0 \le \alpha \le \theta \le \beta \le 2\pi$, then the area enclosed by the polar curve $r = f(\theta)$ and the lines $\theta = \alpha$ and $\theta = \beta$ is given by

Back to Gameboard

Answer

$300

If the function $r = f(\theta)$ is continuous and nonnegative for $0 \le \alpha \le \theta \le \beta \le 2\pi$, then the area enclosed by the polar curve $r = f(\theta)$ and the lines $\theta = \alpha$ and $\theta = \beta$ is given by

$$\frac{1}{2}\int_{\alpha}^{\beta} f(\theta)^{2}\, d\theta$$

Back to Problem

Back to Gameboard

$400

Find the slope of $r = 2 - \sin\theta$ at $\theta = \pi$

Back to Gameboard

Answer

$400

Find the slope of $r = 2 - \sin\theta$ at $\theta = \pi$

2

$500

Find the area shared by the circle $r = 2$ and the cardioid $r = 2(1 - \cos\theta)$

Back to Gameboard

Answer

Find the area shared by the circle $r = 2$ and the cardioid $r = 2(1 - \cos\theta)$

$500

7.708

Back to Problem

Back to Gameboard

$100

Determine the maximum value of the solution to the initial value problem:

$$\frac{dy}{dt} = y - 2yt,\ y(0) = 1$$

Back to Gameboard

Answer

$100

Determine the maximum value of the solution to the initial value problem:

$$\frac{dy}{dt} = y - 2yt,\ y(0) = 1$$

$$e^{\frac{1}{4}}$$

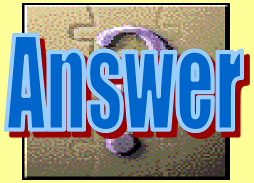
Back to Problem

Back to Gameboard

Use Euler's Method with $\Delta x = \frac{1}{2}$ to approximate the value of y at $x = 1$ for the solution curve to the differential equation

$$\frac{dy}{dx} = 2x^2 - y^2$$

which passes through (0,1).



$200

Use Euler's Method with $\Delta x = \frac{1}{2}$ to approximate the value of y at $x = 1$

for the solution curve to the

differential equation $\frac{dy}{dx} = 2x^2 - y^2$ which passes through (0,1).

$$\frac{5}{8}$$

$300

The rate of change with respect to time in the volume, *V*, of a sphere is inversely proportional, with proportionality constant *k*, to the square of the sphere's radius, *r*. A differential equation representing the change in the radius with respect to time is:

Back to Gameboard

Answer

$300

The rate of change with respect to time in the volume, *V*, of a sphere is inversely proportional, with proportionality constant *k*, to the square of the sphere's radius, *r*. A differential equation representing the change in the radius with respect to time is:

$$\frac{dr}{dt} = \frac{k}{4\pi r^4}$$

Back to Problem

Back to Gameboard

$400

A heated cup of coffee of temperature 130^{o}F is placed in a room of constant temperature 70^{o}F. Write and solve the differential equation of temperature T with respect to time t.

Back to Gameboard

Answer

$400

A A heated cup of coffee of temperature 130ºF is placed in a room of constant temperature 70ºF. Write and solve the differential equation of temperature *T* with respect to time *t*.

$$\frac{dT}{dt} = -k(T - 70)$$

$$T - 70 = 60e^{-kt}$$

Back to Problem

Back to Gameboard

$500

$V = \frac{1}{3}\pi r^2 h$ for a cone. Water is leaking out of a conical funnel of which the height is 12 cm and the diameter is 10 cm. Water is leaking out at a rate of $5\text{cm}^3/\text{min}$. At what rate is the height of the water changing when there are 4 cm of water standing in the cone?

Back to Gameboard

Answer

$V = \frac{1}{3}\pi r^2 h$ for a cone. Water is leaking out of a conical funnel of which the height is 12 cm and the diameter is 10 cm. Water is leaking out at a rate of $5\text{cm}^3/\text{min}$. At what rate is the height of the water changing when there are 4 cm of water standing in the cone?

$500

$$-\frac{9}{5}\pi \; cm/\text{min}$$

Back to Problem

Back to Gameboard

$100

What are all the *x*-coordinates of the critical points for the graph of

$$f(x) = (x-4)(x-2)?$$

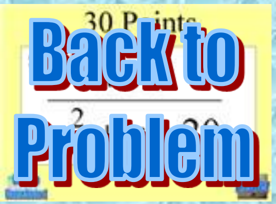
Back to Gameboard

Answer

$100

What are all the *x*-coordinates of the critical points for the graph of $f(x) = (x-4)(x-2)$?

3



DAILY DOUBLE

The total area of the region bounded by the graph of

$$y = x(1-x)(x-2)$$

and the *x*-axis is

Back to Gameboard

Answer

The total area of the region bounded by the graph of

$$y = x(1 - x)(x - 2)$$

and the *x*-axis is

$$\frac{1}{2}$$

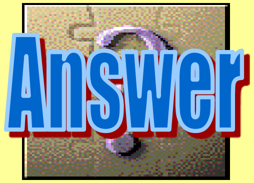
Back to Problem

Back to Gameboard

$300

The average value of $y = \sqrt{x}$

on the interval [1,16] is



The average value of

$$y = \sqrt{x}$$

on the interval [1,16] is

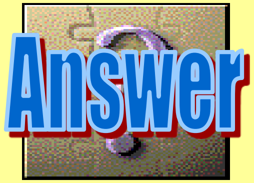
$$\frac{42}{15}$$

Back to Problem

Back to Gameboard

$400

$$\int \frac{4x^3 + 2x + 1}{x^2}\,dx$$



$400

$$\int \frac{4x^3+2x+1}{x^2}\,dx$$

$$2x^2+2\ln|x|-\frac{1}{x}+C$$

Back to Problem

Back to Gameboard

$500

The foot of a 20’ ladder is being pulled away from a wall at the rate of 1.5 ft/sec. At the instant when the foot is 12 ft. away from the wall, the angle the ladder makes with the floor is decreasing at the rate (in radian/sec) of:

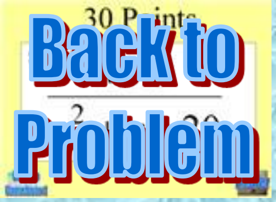
Back to Gameboard

Answer

$500

The foot of a 20’ ladder is being pulled away from a wall at the rate of 1.5 ft/sec. At the instant when the foot is 12 ft. away from the wall, the angle the ladder makes with the floor is decreasing at the rate (in radian/sec) of:

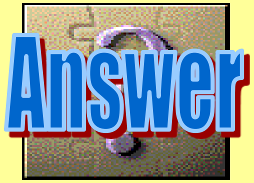
$$-\frac{3}{32}$$



Final Jeopardy

If $f(x) = \begin{cases} e^{-x} + 2, & x < 0 \\ ax + b, & x \geq 0 \end{cases}$ is differentiable

at x = 0, then a + b =??? (answer is a constant!)



Final Jeopardy

If $f(x) = \begin{cases} e^{-x} + 2, & x < 0 \\ ax + b, & x \geq 0 \end{cases}$ is differentiable

at x = 0, then a + b =??? (answer is a constant!)

$$= 2$$

Back to Problem

Back to Gameboard

Final Jeopardy

Nice Try.

Sound and other objects

sn0065A Slot machines

J0074879 Space Laser

J0074877 Space Laser 2

J0097484 Large Explosion

J0074988 Space Door

Do Not Delete!
Contains objects for game.

Design Credits

PowerPoint Slide Show created by

Randy Wyatt

Green Hope High School

Morrisville, NC

Adapted from Slide Show by Carol Nata

Revision History

Version 4 – June 2003

- Changed points to dollars
- Added link to credits screen by clicking on “Math Jeopardy” on game board
- Changed problems and answers to generic place holders
- Minor color and sound changes on opening game screen

Version 5 – September 2003

- Removed macros and visual basic code
- Rearranged “back to problem” and “back to game board” buttons on answer pages

Testing Area

Help for Teachers

To create a new set of categories and problems:

- Update topics on title screen (slide 2)
- Rename category headers on question board (slide 3)
- Change category help slides (immediately following question board)
- Modify questions and answers (answers immediately follow each question slide)
- Cut and Paste Daily Doubles

Tips:

- Questions and answers are MathType objects. It is easier if you keep it that way. Even for text problems.
- To put copy of question on the answer slide, copy and paste the MathType object from the question slide then resize.
- The EXIT graphic on the game board will exit WITHOUT saving anything. It is intended for student use when playing.
- Make sure you test your game to make sure everything is linked and working correctly.
- When playing the intro screen of the game you can click in the lower right corner at any time to skip the intro and go directly to the question board.

Do NOT:

- Change any hyperlinks

Type <ctrl><home> to return to 1st slide

Chapter 5 Topics (Integration)

- Finding integrals using geometric shapes
- Rectangular Approximation Methods (left, right, midpoint)
- Trapezoidal Method of approximating area
- AVERAGE VALUE THEOREM
- Integral Properties
- Fundamental Theorem (derivatives and integrals undo each other)
- Fundamental Theorem, Part 2

$$\int_a^b f(x)dx = F(b) - F(a)$$