

Jeopardy Game



Precalculus

Functions

Limits

Derivative

Evaluation of
derivatives

Theory

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Precalculus for 100.



$$\ln \frac{x}{y} =$$

$\ln x + \ln y$

$\ln x - \ln y$

$x \ln y$

$y \ln x$

none of them

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Precalculus for 200.

The function $y = x^2 \cdot \sin x$ is

odd

even

neither odd nor even

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Precalculus for 300.



$\arctan 1 =$

∞
 $\frac{\pi}{3}$
 $\frac{3\pi}{4}$
 $\frac{4\pi}{6}$

none of them

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Precalculus for 400.

The equivalence " $a < b$ if and only if $f(a) < f(b)$ " is the property of

- even functions
- one-to-one functions
- continuous functions
- increasing functions
- none of them

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Functions for 100.

How many points of inflection is on the graph of the function $y = \sin x$ in the open interval $(0, 2\pi)$

none

one

two

three

none of them

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Functions for 200.

Find points of discontinuity of the function $y = \frac{x - 4}{(x - 2) \ln x}$

none

0

0, 1

0, 1, 2

0, 2

0, 1, 4

0, 4

none of them

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Functions for 300.

Let f be a function and f^{-1} be its inverse. Then $f^{-1}(f(x)) =$

0

1

x

$f(x)$

$f^{-1}(x)$

none of them

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Functions for 400.

$\arcsin(\sin x) = x$ for every $x \in \mathbf{R}$

Yes

No

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Limits for 100.

$$\lim_{x \rightarrow -\infty} \operatorname{arctg} x =$$

0

$\frac{\pi}{2}$

2

$-\frac{\pi}{2}$

∞

$-\infty$

none of them

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Limits for 200.

$$\lim_{x \rightarrow \infty} \sin x =$$

1

-1

does not exist

none of them

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Limits for 300.

$$\lim_{x \rightarrow \infty} \frac{2x^3 + x^2 + 4}{x^2 - x + 2} =$$

∞

2

0

none of them

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Limits for 400.

$$\lim_{x \rightarrow 0^+} \frac{e^{1/x}(x-1)}{x}$$

0

1

e

∞

-1

$-e$

$-\infty$

none of them

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Derivative for 100.

$$\left(\frac{1}{\sqrt[3]{x}}\right)' =$$

$$\frac{1}{3}x^{-2/3}$$

$$-\frac{1}{3}x^{-2/3}$$

$$-\frac{1}{3}x^{1/3}$$

$$\frac{1}{3}x^{-4/3}$$

$$-\frac{1}{3}x^{-4/3}$$

none of them

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Derivative for 200.

$$(x - x \ln x)' =$$

$\ln x$

$-\ln x$

$1 + \ln x$

$1 - \ln x$

0

$1 - \frac{1}{x}$

none of them

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Derivative for 300.

$$(x^2 e^{x^2})'$$

$$2xe^{2x}$$

$$2xe^{x^2} 2x$$

$$2xe^{x^2} + x^2 e^{x^2}$$

$$2xe^{x^2} + x^2 e^{x^2} 2x$$

$$2xe^{x^2} 2x + x^2 e^{x^2} 2x$$

none of them

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Derivative for 400.

The definition of the derivative of the function f at the point a is

$$\lim_{h \rightarrow 0} \frac{f(x+h) + f(x)}{h}$$

$$\lim_{h \rightarrow 0} \frac{f(x+h)}{h}$$

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$\lim_{h \rightarrow 0} \frac{f(x) - f(x+h)}{h}$$

$$\lim_{h \rightarrow 0} \frac{f(x-h) - f(x)}{h}$$

none of them

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Evaluation of derivatives for 100.

$$(x^2 + 1)' =$$

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Evaluation of derivatives for 200.

$$(xe^x)' =$$



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Evaluation of derivatives for 300.

$$\ln(\sin x) =$$



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Evaluation of derivatives for 400.

$$(xe^{-x})' =$$



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Theory for 100.

By theorem of Bolzano, the polynomial $y = x^3 + 2x + 4$ has zero on

(0, 1)

(1, 2)

(2, 3)

(-1, 0)

(-2, -1)

(-3, -2)

none of them

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Theory for 200.

Let $a \in \text{Im}(f)$. Then the solution of the equation $f(x) = a$ exists. This solution is unique if and only if

f is one-to-one

f is increasing

f continuous

f differentiable

none of them

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Theory for 300.

If the function has a derivative at the point $x = a$, then it is

- increasing at a .
- decreasing at a .
- one-to-one at a .
- continuous at a .
- undefined at a .

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Theory for 400.

If both $y(a) = y'(a) = y''(a) = 0$, then the function

has local maximum at a .

has local minimum at a .

has point of inflection at a .

any of these possibilities may be true, we need more information.

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