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QUESTION 1



Drag and drop the correct answer into the space(s) provided.

The standard normal distribution of grades on a test, sometimes called a bell curve, is modeled by the function:

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{\frac{-x^2}{2}}$$

.

What is the maximum height of the curve? This will occur when the slope of the tangent line is zero.

The slope of the tangent line is the derivative:

$$f'(x) = \frac{d}{dx} \left(\frac{1}{\sqrt{2\pi}} e^{\frac{-x^2}{2}} \right)$$

Use

$$\frac{d}{dx}(e^u) = e^u \frac{du}{dx}$$

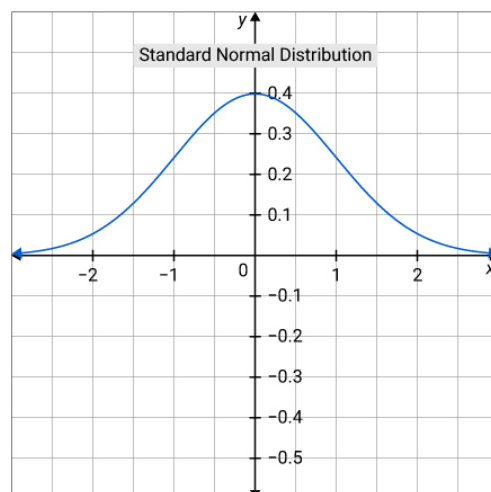
with

$$u = \frac{-x^2}{2}$$

$$f'(x) =$$

$$\frac{1}{\sqrt{2\pi}} e^u \frac{d}{dx} \left(\frac{-x^2}{2} \right) \checkmark$$

$$f'(x) =$$



$$\frac{-x}{\sqrt{2\pi}} e^{\frac{-x^2}{2}} \quad \checkmark$$

Solve for

x

, when

$$f'(x) = 0$$

.

The maximum height of the graph, at

$x =$

$$0 \quad \checkmark$$

$$\frac{x}{\sqrt{2\pi}} e^{\frac{-x^2}{2}}$$

1

$$\frac{1}{\sqrt{2\pi}} e^x \frac{d}{dx} \left(\frac{-x^2}{2} \right)$$

QUESTION 2



Fill in the blank(s) with the correct answer.

Radioactive plutonium 239 has a half-life of 24,100 years. If there is initially 500 grams of the isotope present in a sample, how many grams will be left after 50,000 years? At what rate is the amount changing? The decay is modeled by the function:

$$N(t) = N_0 e^{\frac{(-0.7)t}{24100}}$$

where

N_0



is the initial amount and

t

is the time in years.

In 50,000 years there will be ✓ grams of plutonium left in the sample. (Round to the nearest whole number)

In 50,000, it will be changing at a rate of ✓ grams per year. (Round to 4 decimal places)

QUESTION 3



Fill in the blank(s) with the correct answer.

The number of shares (in millions) traded on the world stock market from 2000 to 2020 can be modeled by

$$y = 69230 (2.7)^{0.1715 t}$$

where

$$t = 0$$

corresponds to 2000. Find the rate of the number of shares traded in 2010. *Rounded your answer to two decimal places.*

The rate of change in 2010 was about

✓ million shares per year.



QUESTION 4



Fill in the blank(s) with the correct answer.

An investment's amount is modeled by the function

$$A(t) = P(1.25)^t$$

where

P

is the initial amount and

t

is in years. Find the instantaneous rate of change of an AED 1000 investment after 3 years.

Round your answer to two decimal places.

The instantaneous rate of change after 3 years of an AED 1000 investment is about AED

435.83



QUESTION 5



Fill in the blank(s) with the correct answer.

The population of a group of 50 fruit flies increases in an exponential manor, as modeled by the function:

$$P(t) = 35 e^{0.55 t}$$

where

t

is in days.

What is the rate of fruit fly growth after 2 days, and after 5 days? *rounded to the nearest whole number.*

The rate of growth after 2 days is

58



fruit flies per day.

The rate of growth after 5 days is

301



fruit flies per day.



QUESTION 6



Choose the correct answer from the drop-down menu.

Find the derivative of the function

$$f(x) = e^{\frac{2x^5}{3x+4}}$$

.

$$f'(x) =$$

$$e^{\frac{2x^5}{3x+4}} \left(\frac{24x^5 + 40x^4}{9x^2 + 24x + 16} \right) \quad \checkmark \quad \blacktriangledown$$

QUESTION 7



Choose the correct answer from the drop-down menu.

Find the derivative of

$$f(x) = 5x^7 e^{8x^3}$$

.

$$f'(x) =$$

$$(35x^6)e^{8x^3} + (120x^9)e^{8x^3} \quad \checkmark \quad \blacktriangledown$$

QUESTION 8



Choose the correct answer from the drop-down menu.

Find the derivative of

$$f(x) = 5^x$$

.

$$f'(x) =$$

$$5^x \ln 5 \quad \checkmark \quad \blacktriangledown$$

QUESTION 9



Choose the correct answer from the drop-down menu.

Find the derivative of

$$f(x) = \frac{4^x}{3 + 6^x}$$

.

$$f'(x) =$$

$$\frac{3(4^x) \ln 4 + 24^x \ln 4 - 24^x \ln 6}{9 + 6(6^x) + 36^x} \quad \checkmark \quad \blacktriangledown$$

QUESTION 10



Choose the correct answer from the drop-down menu.

What is the derivative of

$$f(x) = 6e^x$$

?

$$f'(x) =$$

$6e^x$ ✓ ▼

QUESTION 11



Select the correct option.

What is the derivative of

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

?

☒ $f'(x) = 2^x \ln 2$



☐ $f'(x) = 2^x \ln x$

☐ $f'(x) = 1 + 2^x \ln x$

☐ $f'(x) = 1 + 2^x$

QUESTION 12



Select the correct option.

What is the derivative of

$$f(x) = x^2 3^x$$

?

☐ $f'(x) = 2x3^x + x^23^x$

☐ $f'(x) = 6^x + 3^{2x} \ln 3$

☒ $f'(x) = 2x3^x + x^23^x \ln 3$



☐ $f'(x) = 2x^23^x + x^23^x \ln 3$

QUESTION 13



Select the correct option.

What is the derivative of

$$f(x) = x^2 e^x$$

?

☐ $f'(x) = x e^x + x^2 e^x$

☒ $f'(x) = 2x e^x + x^2 e^x$



☐ $f'(x) = 2x^2 e^x + x e^x$

☐ $f'(x) = x^2 e^x$

QUESTION 14



Select the correct option.

What is the derivative of

$$f(x) = e^{4x^2 + 5x}$$

?

☐ $f'(x) = (8x + 5) e^x$

☒ $f'(x) = (8x + 5) e^{4x^2 + 5x}$



☐ $f'(x) = (4x^2 + 5x)e^{4x^2 + 5x}$

☐ $f'(x) = e^{4x^2 + 5x}$

QUESTION 15



Select the correct option.

What is the derivative of the function

$$f(x) = 4^x e^{3x^2 + 1}$$

?

☐ $f'(x) = 4^x e^x (\ln 4) + 4^x e^x (6x)$

☐ $f'(x) = 4^x e^{3x^2 + 1} (\ln x) + 4^x e^{3x^2 + 1} (6x)$

☐ $f'(x) = x^4 e^{3x^2 + 1} (\ln 4) + 4^x e^{3x^2 + 1} (6x)$

☒ $f'(x) = 4^x e^{3x^2 + 1} (\ln 4) + 4^x e^{3x^2 + 1} (6x)$



