

14 points

Read the instructions below!!! (You may work together, but each person should turn in their own paper.)

A. **To the right of each function Circle the letter P** if the problem (as it is written) would require the use of the product rule for differentiation, a **Q** if the problem would require the quotient rule for differentiation, and/or a **C** if the problem would require the chain rule (for exponentials or ln's) for differentiation. Some functions may be combos of **PC** or **QC**, so you may circle more than one letter.

B. **Differentiate** each function. Show work on a piece of paper. Use correct notation. Answers are listed at the bottom of the page (See A.-P. below the 'Derivatives'). Write the letter that corresponds to the derivative of the function **in the blank** next to each function and **also type your letter answer into your clicker.**

1. A $y = 100e^{0.05x}$ P Q C
 $y' = 100(\frac{0.05}{100})e^{0.05x}$

3. D $y = (e^x + 4)^3$ P Q C
 $y' = 3(e^x + 4)^2 \cdot e^x$

5. M $y = e^{4x+2}$ P Q C
 $y' = 4e^{4x+2}$

7. N $y = \frac{x}{1 + \ln x}$ P Q C
 $y' = \frac{1 + \ln x - x(\frac{1}{x})}{(1 + \ln x)^2} = \frac{\ln x}{(1 + \ln x)^2}$

9. L $y = x^2 \ln(2x+1)$ P Q C
 $y' = x^2(\frac{2}{2x+1}) + \ln(2x+1)(2x) = 2x(\frac{x}{2x+1} + \ln(2x+1))$

11. K $y = x^3 [\ln(10x)]$ P Q C
 $y' = x^3(\frac{1}{10x}(10)) + \ln(10x)(3x^2)$

13. H $y = x \ln x - x + 2$ P Q C
 $y' = x(\frac{1}{x}) + \ln x(1) - 1 = \ln x$

2. O $y = e^{x^2} + 5x^2$ P Q C
 $y' = 2xe^{x^2} + 10x$

4. B $y = x^2 e^{5x}$ P Q C
 $y' = x^2(5e^{5x}) + e^{5x}(2x)$

6. F $y = 2xe^x - \frac{1}{\sqrt{x}}$ P Q C
 $y' = 2xe^x + e^x(2) + \frac{1}{2}x^{-3/2}$

8. E $y = \ln(x^2 + 1)$ P Q C
 $y' = \frac{1}{x^2+1}(2x)$

10. G $y = x^2 \ln(x)$ P Q C
 $y' = x^2(\frac{1}{x}) + \ln(x)(2x) = x + 2x \ln x$

12. I $y = \frac{e^{2x}}{x^2 + 1}$ P Q C
 $y' = \frac{(x^2+1)2e^{2x} - e^{2x}(2x)}{(x^2+1)^2}$

14. C $y = 8 \cdot \ln(2x+1)$ P Q C
 $y' = \frac{8}{2x+1}(2) = \frac{16}{2x+1}$

Derivatives: (These letters go in the blanks above. Not all answers will be used. None will be used twice.)

A. $y' = 5e^{0.05x}$

B. $y' = xe^{5x}(5x+2)$

C. $y' = \frac{16}{2x+1}$

D. $y' = 3e^x(e^x + 4)^2$

E. $y' = \frac{2x}{x^2+1}$

F. $y' = 2xe^x + 2e^x + \frac{1}{2}x^{-3/2}$

G. $y' = x(1 + 2 \ln x)$

H. $y' = \ln x$

I. $y' = \frac{2e^{2x}(x^2 - x + 1)}{(x^2 + 1)^2}$

J. $y' = x^2 \left(\frac{2}{3} + \ln x \right)$

K. $y' = x^2(1 + 3 \ln(10x))$

L. $y' = \frac{2x^2}{2x+1} + 2x \ln(2x+1)$

M. $y' = 4e^{4x+2}$

N. $y' = \frac{\ln x}{(1 + \ln x)^2}$

O. $y' = 2x(e^{x^2} + 5)$

P. None of these.

$\frac{2e^{2x}(x^2+1-1)}{(x^2+1)^2}$