Mathematical Matching Game – Derivative, product rule

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Instructions: Select a question clicking its checkbox. Solve the problem and find the answer. No guessing! A maximum of 3 tries on any problem before you get 3 penalty points ! Passing is to complete the puzzle with only 4 incorrect answers.

To the picture: Today's **Mr. X** was born on 5 Oct 1781 in Prague, Austrian Habsburg domain (now Czech Republic) and died on 18 Dec 1848 in Prague. **Mr. X** entered the University of Prague in 1796 and studied mathematics, philosophy and physics. Starting in 1800, he also began studying theology, became a Catholic priest and was appointed to the chair of religion in 1805. He proved to be a popular lecturer not just in religion but also philosophy, and was elected head of the philosophy department in 1818. However, his political convictions were too liberal for the conservative institution, and in 1819 he was dismissed from his positions and exiled to the countryside for the remainder of his life.

Mr. X wrote important works on geometry, logic and the foundations of mathematical analysis (calculus). Although forbidden to publish in mainstream journals, he continued to develop his mathematical ideas. Most of his works remained in manuscript and did not become noticed and therefore did not influence the development of the subject. Among others, he introduced a fully rigorous ε-δ definition of a mathematical limit, a modern definition of continuity and the first purely analytic proof of the Intermediate Value Theorem.

Who is Mr. X? – Solve problems on next page.

Questions

1. $y = xe^x$
2. $y = xe^{-x}$
3. $y = x^2e^{2x}$
4. $y = (x^2 + 1)e^x$
5. $y = x^2 \cos x$
6. $y = x^2 \sin x + x \cos x$
7. $y = x \sin x + (x + 1) \cos x$
8. $y = x^2 \sin x$
9. $y = (x^2 + 1)e^{2x}$

Answers

a. $y' = x^2 \sin x - 2x \cos x$

b. $y' = (x + 1)e^x$

c. $y' = 2x(x + 1)e^{2x}$

d. $y' = -x \sin x + (x + 1) \cos x$

e. $y' = -x^2 \sin x + 2x \cos x$

f. $y' = 2(x + 1)e^x$

g. $y' = (x^2 + 1)e^{2x}$

h. $y' = x \sin x + (x^2 - 1) \cos x$

i. $y' = (x^2 + 1)e^x$

j. $y' = (2x + 1)e^x$

k. $y' = x \sin x + (x^2 + 1) \cos x$

l. $y' = (x + 1)^2e^x$

m. $y' = e^{-x}(1 + x)$

n. $y' = (x + 1)^2e^{2x}$

o. $y' = 2(x^2 + x + 1)e^{2x}$

p. $y' = 2x \sin x + x^2 \cos x$

q. $y' = (x + 1) \sin x + x^2 \cos x$

r. $y' = (1 - x)e^{-x}$