MATH 106–PRACTICE PROBLEMS ON DIFFERENTIATION.

Find $y' = \frac{dy}{dx}$ for each of the following:

1) $y = \left(x + x^3 e^x\right)^4$

2) $y = \left(\dfrac{x + \sqrt{x}}{x^2 - 2^x}\right)^{15}$

3) $y = \sqrt{1 + \sqrt{1 + \sqrt{x}}}$

4) $y = \left[\pi + x(x^3 + 5)^{31}\right]^{50}$

5) $y = \dfrac{1 + \sqrt{x^2 + 1}}{xe^x - 1}$

5)' $y = x^x$

6) $y = \sqrt{x}\, e^{x(x+1)^7}$

7) $y = (e^{\frac{1}{x}} - 1)^5 e^x$

8) $y = (\sin(x^2))(\cos(e^x))$

9) $y = \tan\left[\dfrac{x+1}{x-1}\right]^2$

10) $y = (\sin^2(5x))(\tan^3(4x))$

11) $y = \dfrac{\tan^{-1} 3x}{\sqrt{x} + 1}$

12) $y = x^3 \sin^{-1}(\sqrt{x}) + \sec x$

13) $y = \left[x \ln(x^2 + 1)\right]^5$

14) $y = (\sin x)(\ln|\sin x|)$

15) $y = \dfrac{(\ln x) + \sqrt{x}}{x + \ln(2x)}$

16) $y = (\cos x)^{\sin x}$

17) $x^2 \cos(y - 1) - xy^3 = 1 + x$

18) $y = \sqrt[3]{1 + \cos^2 x + \tan^2 x}$

19) $y = \dfrac{\sin x + \cos x}{\tan x + \sec x}$

20) $y = \ln(\csc^2(\sqrt{x}))$

21) $y = x \sinh^3 x + \tanh 4x$