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Differentiate:

1.  $x^2\sqrt{x}$

2.  $5x^{12} - x^{-9} + \frac{4}{x^3} + \sqrt[3]{x}$

3.  $(x^3 + 1)(x^2 + 1)$

1.  $(x^2\sqrt{x})' = (x^{5/2})' = \boxed{\frac{5}{2}x^{3/2}}$

2.  $(5x^{12} - x^{-9} + \frac{4}{x^3} + \sqrt[3]{x})'$   
 $= \boxed{60x^{11} + 9x^{-10} - 12x^{-4} + \frac{1}{3}x^{-2/3}}$

3.  $[(x^3+1)(x^2+1)]' = \boxed{3x^2(x^2+1) + (x^3+1)(2x)}$

OR  $[x^5 + x^3 + x^2 + 1]' = \boxed{5x^4 + 3x^2 + 2x}$