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QUIZ 9

MATH 200
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1. In this problem $y = x^3 + \frac{1}{x} = x^3 + x^{-1}$

(a) $\frac{dy}{dx} = 3x^2 - x^{-2} = \boxed{3x^2 - \frac{1}{x^2}}$

(b) $\frac{d^2y}{dx^2} = 6x + 2x^{-3} = \boxed{6x + \frac{2}{x^3}}$

(c) $\frac{d^3y}{dx^3} = 6 - 6x^{-4} = \boxed{6 - \frac{6}{x^4}}$

2. $D_x [\cos(e^x)] = \boxed{-\sin(e^x)e^x}$

3. $D_x [\tan\left(\frac{x^5+1}{5x}\right)] = \sec^2\left(\frac{x^5+1}{5x}\right) \frac{(5x^4+0)5x - (x^5+1)\cdot 5}{(5x)^2}$

$$= \sec^2\left(\frac{x^5+1}{5x}\right) \frac{25x^5 - 5x^5 - 5}{25x^2} = \boxed{\sec^2\left(\frac{x^5+1}{5x}\right) \frac{4x^5 - 1}{5x^2}}$$

4. $D_x [\sec(x^5 + x)] = \boxed{\sec(x^5 + x) \tan(x^5 + x) (5x^4 + 1)}$



1. In this problem $y = x^2 + \frac{1}{x^2} = x^2 + x^{-2}$

(a) $\frac{dy}{dx} = 2x - 2x^{-3} = \boxed{2x - \frac{2}{x^3}}$

(b) $\frac{d^2y}{dx^2} = 2 + 6x^{-4} = \boxed{2 + \frac{6}{x^4}}$

(c) $\frac{d^3y}{dx^3} = -24x^{-5} = \boxed{-\frac{24}{x^5}}$

2. $D_x [\csc(e^x)] = \boxed{-\csc(e^x)\cot(e^x)e^x}$

3. $D_x [\cot(x^5 + x)] = \boxed{-\csc^2(x^5 + x)(5x^4 + 1)}$

4. $D_x [\sin(\frac{x^5 + 1}{5x})] = \cos\left(\frac{x^5 + 1}{5x}\right) \frac{(5x^4 + 0)5x - (x^5 + 1)5}{(5x)^2}$

$$= \cos\left(\frac{x^5 + 1}{5x}\right) \frac{25x^5 - 5x^5 - 5}{25x^2} = \boxed{\cos\left(\frac{x^5 + 1}{5x}\right) \frac{4x^5 - 1}{5x^2}}$$