

Name _____

Section _____

NOTE: You may NOT use a calculator for this quiz.

Match each of the following functions with its derivative (1 point each):

- | | $f(x)$ | $f'(x)$ | | |
|----|----------|--------------|----|-----------|
| 1) | $\sin x$ | <u> b </u> | a. | $1/x$ |
| 2) | $\cos x$ | <u> d </u> | b. | $\cos x$ |
| 3) | e^x | <u> c </u> | c. | e^x |
| 4) | $\ln x$ | <u> a </u> | d. | $-\sin x$ |

Evaluate the following derivative and simplify as much as possible (6 points):

$$\begin{aligned}
 5) \quad & D_x \left[2x^2 \ln x - x^2 + \frac{x}{x+3} \right] \\
 &= 2 \cdot D_x [x^2 \ln x] - D_x [x^2] + D_x \left[\frac{x}{x+3} \right] \\
 &= 2 \cdot (x^2 \cdot D_x [\ln x] + D_x [x^2] \cdot \ln x) - 2x + \frac{(x+3) \cdot D_x [x] - x \cdot D_x [x+3]}{(x+3)^2} \\
 &= 2 \cdot \left(x^2 \cdot \frac{1}{x} + 2x \cdot \ln x \right) - 2x + \frac{(x+3) \cdot 1 - x \cdot 1}{(x+3)^2} \\
 &= 2 \cdot (x + 2x \ln x) - 2x + \frac{x+3-x}{(x+3)^2} \\
 &= 2x + 4x \ln x - 2x + \frac{3}{(x+3)^2} \\
 &= \boxed{4x \ln x + \frac{3}{(x+3)^2}}
 \end{aligned}$$

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| | $f(x)$ | $f'(x)$ | | |
|----|----------|---------|----|-----------|
| 1) | $\ln x$ | __d__ | a. | $-\sin x$ |
| 2) | e^x | __b__ | b. | e^x |
| 3) | $\cos x$ | __a__ | c. | $\cos x$ |
| 4) | $\sin x$ | __c__ | d. | $1/x$ |

Evaluate the following derivative and simplify as much as possible (6 points):

$$\begin{aligned}
 5) \quad & D_x \left[3x^3 \ln x - x^3 + \frac{x}{x+2} \right] \\
 &= 3 \cdot D_x [x^3 \ln x] - D_x [x^3] + D_x \left[\frac{x}{x+2} \right] \\
 &= 3 \cdot (x^3 \cdot D_x [\ln x] + D_x [x^3] \cdot \ln x) - 3x^2 + \frac{(x+2) \cdot D_x [x] - x \cdot D_x [x+2]}{(x+2)^2} \\
 &= 3 \cdot \left(x^3 \cdot \frac{1}{x} + 3x^2 \cdot \ln x \right) - 3x^2 + \frac{(x+2) \cdot 1 - x \cdot 1}{(x+2)^2} \\
 &= 3 \cdot (x^2 + 3x^2 \ln x) - 3x^2 + \frac{x+2-x}{(x+2)^2} \\
 &= 3x^2 + 9x^2 \ln x - 3x^2 + \frac{2}{(x+2)^2} \\
 &= \boxed{9x^2 \ln x + \frac{2}{(x+2)^2}}
 \end{aligned}$$