Instructions: This quiz is closed book, closed note, and an individual effort. Electronic devices other than approved calculators are not allowed on your person (e.g., no cell phones or calculators with CAS). Answer each question. **Show all work to receive full credit.** Unless the question specifies, you may provide either an exact answer or round to two decimal places.

1) Differentiate (compute the derivative) each of the following functions:

(a) $f(x) = 5x^4 + 3x^3 + 2x^2 + \sqrt{x} + \frac{1}{\sqrt{x}}$

Answer: Either of the following answers are correct. Note that $f'(x)$ is the derivative of $f(x)$, while $\frac{d}{dx}f(x)$ reads *differentiate f(x)*.

$$f'(x) = 20x^3 + 9x^2 + 4x + \frac{1}{2}x^{-1/2} + \frac{3}{2}x^{-3/2}$$

$$\frac{d}{dx}f(x) = 20x^3 + 9x^2 + 4x + \frac{1}{2}x^{-1/2} + \frac{3}{2}x^{-3/2}$$

CAUTION: Note that $\frac{d}{dx}$ is a **verb**, not a noun. $\frac{d}{dx}f(x)$ reads *differentiate f(x)*. So the following is an **INCORRECT** answer. I was very lenient with partial credit on the quiz, but will be less generous on the exam.

$$\frac{d}{dx} = 20x^3 + 9x^2 + 4x + \frac{1}{2}x^{-1/2} + \frac{3}{2}x^{-3/2}$$

(b) $g(x) = e^x + \log_2(x) + 2^x + 1$

Answer:

$$\frac{d}{dx}g(x) = e^x + \frac{1}{x\ln(2)} + \ln(2)2^x + 0 \quad \text{(You may omit the 0)}$$

(c) 0

Answer:

$$\frac{d}{dx}0 = 0$$

(d) $h(x) = \ln(x) + 3 \cdot 2^x + \frac{1}{x} + x^{-1}$

Answer:

$$\frac{d}{dx}h(x) = \frac{1}{x} + 3\ln(2)2^x - 2x^{-2}$$

(e) $m(x) = 5 \cdot 2^x + 4 \cdot x^2$

Answer:

$$\frac{d}{dx}m(x) = 5\ln(2)2^x + 8x$$

$$\frac{d}{dx}m(x) = 5\ln(2)2^x + 8x$$