Name: _____

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Do not use any unapproved aids while taking this assessment. Read each question carefully and be sure to show all work in the space provided.

1. Demonstrate and explain how to find the derivative of the following functions. Be sure to explicitly denote which derivative rules (scalar multiple, sum/difference, etc.) you are using in your work. (Note that we use the notation $\log(x) = \ln(x) = \log_e(x)$.)

   (a)
   $$f(w) = -7\,w^5 - 8\,w^3 - 6\,w + 8$$

   (b)
   $$h(y) = -3\,\cos(y) + 2\,e^y$$

   (c)
   $$g(x) = \sqrt[3]{x^4} + \frac{6}{x^2}$$

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2. Demonstrate and explain how to find the derivative of the following functions. Be sure to explicitly denote which derivative rules (product, quotient, sum and difference, etc.) you are using in your work.

   (a)
   $$h(t) = -\left(3\,t^2 + 5\,t - 5\right)\ln\left(t\right)$$

   (b)
   $$f(w) = \frac{3\,w^2 - 4\,w + 2}{w^7}$$

   (c)
   $$g(y) = \frac{\sin\left(y\right)}{3\,y^2 + 3\,y + 1}$$

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3. Demonstrate and explain how to find the derivative of the following functions. Be sure to explicitly denote which derivative rules (product, quotient, sum and difference, etc.) you are using in your work.

(a)

$$g(y) = -9\,\cos\left(y^{\frac{5}{2}}\right)$$

(b)

$$f(x) = -9\left(\cos\left(x\right)\right)^{\frac{5}{2}}$$

(c)

$$k(w) = 3\,\sin\left(3\,w^2 - 3\,w - 2\right)$$

(d)

$$h(t) = \left(t - 2\,e^t + 4\right)^6$$

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4. Demonstrate and explain how to find the derivative of the following functions. Be sure to explicitly denote which derivative rules (constant multiple, sum and difference, etc.) you are using in your work.

   (a)
   $$g(y) = \left(3\,y^4 + 7\,y\right)^3 y^{\frac{1}{3}}$$

   (b)
   $$f(w) = \left(-\frac{2\,(w-1)}{3\,(w^5-2)}\right)^4$$

   (c)
   $$h(x) = \sqrt{\sin\left(5\,x^2 - 6\right)}$$

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5. Explain how to use implicit differentiation to find $\frac{dy}{dx}$ for each of the following equations.

(a)

$$3\,x^4 - 5\,e^y = y^5 - 9$$

(b)

$$0 = 2\,y \sin(x) + 5\,\cos(x)$$