Name: ———————————————————————————   ————— / 20

There are 20 points possible on this quiz. No aids (book, calculator, etc.) are permitted. Show all work for full credit.

1. **[8 points]** For each function below, find its derivative. You do not need to simplify your answer.

   a. $h(t) = \dfrac{2}{t^2} + \dfrac{t^2}{2}$

   b. $f(x) = \dfrac{2\sqrt{x}}{3} - x^e + \sqrt{2}$

   c. $g(x) = x^{2/3}(e^x - 1)$

   d. $y = \dfrac{2x^3 - 3}{x^2 - x}$

2. [6 points] Suppose that $g(3) = 3$, $g'(3) = -1$, $h(3) = -2$, and $h'(3) = 5$. Find the following values:

    a. $(g-h)'(3) =$

    b. $(4h-g)'(3) =$

    c. $(gh)'(3) =$

    d. $\left(\frac{h}{g}\right)'(3) =$

3. [3 points] If $s = 2e^t - 6t$ is the equation of motion of a particle at time t seconds, what is the velocity **and** acceleration of that particle at time $t = 0$? If s is measure in meters, give correct units for both answers.

4. [3 points] At what x-value or values on the curve $y = x^3 + 2x^2 - 2x - 9$ is the tangent line perpendicular to the line $y = \frac{1}{2}x + \frac{5}{3}$? [Hint: recall two lines are perpendicular if their slopes are opposite reciprocals.]