Math 4 Honors   Name _____
Lesson 6-4 Learning Check   Date _____

In this learning check, you will be assessed on the following concepts:
- *I can find derivatives using the Power Rule.*
- *I can use derivatives to find the velocity and acceleration of a moving object and solve problems involving particle motion.*

1. $g(x) = -2x^2 - 10x + 10,201$ Find $g'(x)$.

   $g'(x) = -4x - 10$

2. $y = -4\sqrt{x^5}$ Find $\dfrac{dy}{dx}$. Write your final answer in radical form.

   $y = -4x^{\frac{5}{2}}$ $\dfrac{dy}{dx} = -4 \cdot \dfrac{5}{2} x^{\frac{3}{2}} = -10x^{\frac{3}{2}} = \boxed{-10\sqrt{x^3}}$

3. $y = 8x^7 - \dfrac{4}{x^3} + \dfrac{10}{x^7} - 123$ Find y'. Write your final answer in rational form.

   $y' = 56x^6 + 12x^{-4} - 70x^{-8} = \boxed{56x^6 + \dfrac{12}{x^4} - \dfrac{70}{x^3}}$

4. A particle moves on a number line and its position at time t is given by:

   $s(t) = 2t^3 - 15t^2 + 24t + 12, \quad t \geq 0$

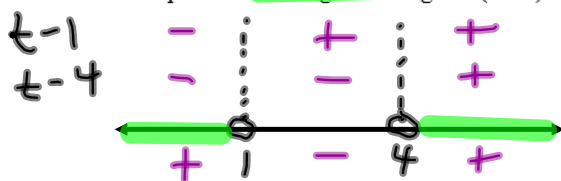   a. Write an expression for the velocity and the acceleration of the particle at any time t.

   $s'(t) = 6t^2 - 30t + 24$ $s''(t) = 12t - 30$

   b. When is the particle at rest?

   $s'(t) = 0 = 6t^2 - 30t + 24$
   $0 = (t-1)(t-4)$
   $t = 1 \quad t = 4$

   c. When is the particle moving to the right? (NLA)

   $t - 1$ $-$ $+$ $+$ $0 \leq t < 1$
   $t - 4$ $-$ $-$ $+$ and
                                     $t > 4$
   $+$ | $-$ 4 $+$

   d. When is the acceleration positive?

   $12t - 30 > 0$
   $t > \dfrac{30}{12}$ $t > \dfrac{5}{2}$

   e. What is the total distance traveled by the particle from $t = 0$ to $t = 5$?

   $s(0) = 12$ ⎤ 11
   $s(1) = 23$ ⎦
   $s(4) = -4$ ⎤ 27
   $s(5) = 7$ ⎦ 11

   Total distance =
   $11 + 27 + 11 = 49$