1. Using Product Rule of derivative to prove that

$$\frac{d}{dx}\big(f(x)g(x)h(x)\big)=\frac{df}{dx}g(x)h(x)+f(x)\frac{dg}{dx}h(x)+f(x)g(x)\frac{dh}{dx}$$

2. Differentiate the following functions. (No need to simplify)

   a)　　$f(x)=\left(3x^2-5x+4\right)\left(2x^3+x^2-2\right)$

   b)　　$f(x)=\dfrac{7x^3-5x+2}{4x^3-2x+7}$

3.   Find the equation of the tangent line to the given curve at the specific point.

a) $f(x) = \dfrac{7x^2 - 2x + 4}{3x^3 - 2x + 2}$; $at\ x = 1$

b) $f(x) = e^x \left(7x^3 - 5x^2 + 2 \right)$; $at\ x = 0$

4. A particle moves according to the law of motion $s = f(t) = t^3 - 8t^2 + 5t + 2$

    a) Find the velocity and acceleration of the particle at time t.
    b) What is the velocity at $t = 3, 7$.
    c) When is the particle at rest?
    d) When is the particle moving in the positive / negative direction?
    e) Find the total distance traveled during the first 8 seconds.
    f) Draw a diagram to illustrate the motion of the particle.

5. If a ball is thrown vertically upward with a velocity of 80 ft/s, then its height after t seconds is $s = 80t - 16t^2$.

   a) What is the maximum height reached by the ball?

   b) What is the velocity of the ball when it is 96 ft above the ground on its way up and on its way down?

   c) Find the impact speed of the ball when it hits the ground.