6. [14 points] The force $F$ due to gravity on a body at height $h$ above the surface of the earth is given by

$$F(h) = \frac{mgR^2}{(R + h)^2}$$

where $m$ is the mass of the body, $g$ is the acceleration due to gravity at sea level ($g < 0$), and $R$ is the radius of the earth.

   a. [3 points] Compute $F'(h)$.

   b. [3 points] Compute $F''(h)$.

   c. [5 points] Find the best linear approximation to $F$ at $h = 0$.

   d. [3 points] Does your approximation from part (c) give an overestimate or an underestimate of $F$? Why?