[1] (25 points) A spacecraft is sent to the planet Mars to survey the planet's surface by hovering over the surface using a rocket engine. The acceleration due to gravity at the surface of Mars is $g_m = 3.7$ m/Sec^2. Without fuel the spacecraft has a mass of $m_s = 1000$ kg. Upon arriving at the surface of Mars the spacecraft has $m_F = 500$ kg of rocket fuel, and the rocket engine exhaust velocity is $v_E = 2000$ m/Sec. How long can the spacecraft hover in a single spot (give an equation and a value)? You may neglect any lateral motion of the spacecraft.