

6. (6 points) Consider the function  $f(x) = 3xe^{ax} + x^2$ , where  $a$  is a constant. If the error in the linear approximation to  $f(x)$  near  $x = 0$  is 0.02 when  $x = 0.1$ , what is  $a$ ? Show your work.

7. (6 points) The kinetic energy,  $K$  in Joules, of a particle in motion is a function of its fixed mass,  $M$  in kg, and its velocity,  $v$ , in  $\frac{m}{s}$ , and is given by:

$$K = \frac{1}{2}Mv^2.$$

For an object with a mass of 2 kg, how fast is its kinetic energy increasing when it is traveling  $3\frac{m}{s}$  and accelerating at a rate of  $10\frac{m}{s^2}$ ?