Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (2 pts. each) Find the first derivative of the following functions.
   (a) \( f(x) = x^3 e^x \).
   
   (b) \( g(t) = \frac{t}{t^2 + 1} \).

2. (4 pts.) Find the first and second derivative of the function \( h(z) = e^{z^3} \).

3. (2 pts. each) A client invests $10,000 in a mutual fund at age 35. If the mutual fund grows at 8% per year, then the value of the mutual fund, \( V \), in dollars, \( t \) years after the initial investment is given by \( V(t) = 10000 e^{0.08t} \).
   (a) Find \( V'(t) \).
   
   (b) Compute the rate of growth of the client’s investment, in dollars per year, when the client is 65.