6. [9 points] The probability density function for the time t (in minutes) it takes for a pizza deliveryman to deliver a pizza is

$$p(t) = p_0 \, t \, e^{-\lambda t^3}$$

This does *not* include the time required to prepare the pizza, only the time required to deliver it.

    a. [4 points] Find a formula for the mean of $p(t)$ in terms of p_0 and λ. Your final answer should not contain any integrals.

    b. [3 points] The pizza parlor advertises that if you don't receive your pizza in 30 minutes or less after you order, then your pizza is free. After your order is taken, it takes 10 minutes for the chef to prepare a pizza for delivery. Write an expression for the probability that the next pizza that gets delivered will be free.

    c. [1 point] If $P(t)$ is the cumulative distribution of $p(t)$, find an expression for $P(20)$.

    d. [1 point] Explain the practical meaning of the number $P(20)$.