Short answer questions — you must show your work

1. **2 marks** Find the absolute maximum of \( f(x) = e^{x^3 - 12x} \) on the interval \([0, 3]\).

   Answer:

2. **2 marks** The cost function of making \( x \) candle-holders a week in your factory is given by \( C(x) = 400 + 4x + \frac{3}{x} \) dollars. What is the marginal cost of making the 201st candle?

   Answer:

3. **2 marks** A vending machine stands in an office buildings and sells \( q \) cans of soft drink an hour for the price of \( p \) dollars a can and the demand equation is given by \( p^3q + q^2 = 180 \). Currently the machine vends 10 cans an hour for $2 a can. Use the price elasticity of demand to determine whether the price of a can should be lowered or raised in order to increase their revenue.

   Answer:
Long answer question — you must show your work

4. [4 marks] A kite is flying 40 meters above the ground when the wind starts to blow it away in a direction parallel to the ground at the rate of $4\,\frac{m}{sec}$. At what rate must the string be let out when the length of string already let out is 80 meters?

Answer: