Physics/Maths Homework (1)

Student:

Date:

Due Date:

Topics:

Notes/Formulas

[Additional notes or definitions if needed]

Problems

Problem 1

[10 marks]

Find the derivative of $f(x) = 3x^4 - 2x^3 + 5x^2 - 7x + 4$. Then, find all values of x where the gradient of the curve is equal to zero. Determine whether each stationary point is a maximum, minimum, or point of inflection.

Answer:

Problem 2

[15 marks]

A small metal sphere of mass 0.15 kg is attached to one end of a light inextensible string of length 0.85 m. The other end of the string is fixed to a point on a ceiling. The sphere is released from rest with the string horizontal, and swings in a vertical plane.

(a) Calculate the speed of the sphere when the string makes an angle of 45° with the vertical. **[5 marks]**

Answer:

(b) Calculate the tension in the string when it makes an angle of 45° with the vertical. **[5 marks]**

Answer:

(c) If the string can withstand a maximum tension of 12 N before breaking, determine the minimum height from which the sphere can be released horizontally without the string breaking at any point in its motion. Assume $g = 9.8$ m/s^2. **[5 marks]**

Answer:

8

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