

Name: _____

1. [4 marks] Approximate $\sqrt[3]{26.9}$ using a linear approximation.

2. [3 marks] The radius r of a holograph is directly proportional to the square root of the wavelength λ of the light used. Show that $\frac{dr}{r} = \frac{1}{2} \frac{d\lambda}{\lambda}$.

3. [4 marks] A metal cube dissolves in acid such that the length of each edge is decreasing by $0.25\text{mm}/\text{min}$. How fast is the volume of the cube changing when the surface area of the cube is 24mm^2 ? Include units in your answer.

4. [6 marks] Find $\frac{dy}{dx}$ for the following functions:

a) $y = \sin(\cos(2\sqrt{x}))$

b) $y = \sqrt{\sec(3x) + \tan(4x)}$

5. [5 marks] The electric potential V on the line $3x + 2y = 6$ is given by $V = 3x^2 + 2y^2$. At what point on this line is the potential a minimum? Give exact values.

6. [8 marks] Let $f(x) = x^5 - 5x + 12$.

a) Find $f'(x)$

b) Find $f''(x)$

c) Find all relative maximum and relative minimum points. Indicate whether each point is a maximum or a minimum.

d) On which interval(s) is $f(x)$ decreasing?

e) Find all points of inflection.

f) Sketch the curve with all points from parts c) and d) labelled.