

AP Calculus In-Class Six – Applications of Differential Calculus

3.4 Curve Sketching; 3.5 Optimization Problems; 3.6 Local Linear Approximations

1. If the position of a particle moving along a horizontal line is given by $s = t^4 - 6t^3 + 12t^2 + 3$.
 - (a) When is the particle at rest?
 - (b) Find the values of t for which the velocity is increasing.
 - (c) Find the values of t for which the speed is increasing.
2. A line is drawn through the point $(1, 2)$ forming a right triangle with the positive x - and y - axes. Find the slope of the line forming the triangle of least area.
3. Find the first-quadrant point on the curve $y^2x = 18$ that is closest to the point $(2, 0)$.

4. If h is a small negative number, then what is the best approximation for $\sqrt[3]{27+h}$?
5. When $x = 3$, the equation $2x^2 - y^3 = 10$ has the solution $y = 2$. When $x = 3.04$ what is the solution of the equation?
6. The edge of a cube has length 10 cm, with a possible error of 1%. What is the possible error, in cubic cm, in the volume of the cube?
7. Approximately how much less than 4 is $\sqrt[3]{63}$?
8. When h is near zero, what is the best local linear approximation for e^{kh} ?