

Practice Midterm 2

MATH 9A

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1. The velocity of a body moving along the x -axis is $v = 2t^2 - 7t + 6$. When is the body moving forward?
2. Suppose for functions f and g , we know $f(1) = 5$, $g(1) = -1.5$, $f'(1) = 11$, $g'(1) = -8$, $f(2) = 3$, $g(2) = -1$, $f'(2) = .3$, $g'(2) = -5$. Find the derivative of
 - (a) $f(x + g(x))$ at $x = 2$
 - (b) $g(f(x) + 2g(x))$ at $x = 1$.
3. Find the tangent line to the parametric curve defined by $x = \tan(2t)$, $y = \sec^2(t)$ when $t = -\frac{\pi}{6}$.
4. If $x^2 + y^3 = 5$, find $\frac{d^2x}{dy^2}$ at the point $(-2, 1)$.
5. Two planes are flying at 35,000 feet along straight line courses that intersect at right angles. Plane A is approaching the intersection at a speed of 300 miles per hour and plane B is approaching the intersection at a speed of 400 miles per hour. At what rate is the distance between the planes changing when A is 50 miles from the intersection point and B is 120 miles from the intersection point?
6. The edge of a cube is measured as 2 inches with an error of 1%. The cube's volume is to be computed from this measurement. Estimate the percentage error in the volume computation.
7. Find the absolute extrema of $f(x) = 1 - 2\sqrt[3]{x^2}$ on the interval $[-8, 1]$.
8. Use Rolle's Theorem to show that $f(x) = \sqrt{x(4-x)}$ has a horizontal tangent line on the interval $[0, 4]$. Then find the x value where f has a horizontal tangent line.
9. Find the intervals where $f(x) = x^3 - 2x^2 + 4$ is increasing.
10. Find the x values where $f(x) = (x + 1)^3(x - 2)^2$ has critical points. Using the first derivative test, identify the critical values as either having a local maximum, a local minimum or neither.
11. Find the intervals where $f(x) = 6x^2 - x^4$ is concave down.