

MATH 1320 EXAM 2 REVIEW
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1. Find $\frac{dy}{dx}$ and evaluate it at the indicated point:

a. $x^2 + xy - y^3 = 4$ at $(2,0)$ b. $\sqrt[3]{x} + \sqrt[3]{y} = 1$ at $(8,-1)$

2. Two planes leave an airport at the same time, one flying due north at 150 mi/hr and the other plane leaves the airport flying due east at 200 mi/hr. At what rate is the distance between the two planes increasing after two hours?
3. All edges of a cube are expanding at a rate of 2 inches per minute. How fast is the surface area changing when each edge is 20 inches?
4. Find the critical numbers (if any) and open intervals on which the following function is increasing or decreasing.

$$f(x) = x^3 - 6x^2$$

5. Find all extrema (relative and absolute) of the following functions:

a. $f(x) = 2x^3 + 3x^2 - 36x + 12$ on $[-4,4]$
b. $f(x) = x^2 + 2x - 4$ on $[-2,1]$

6. Find all the inflection points (if any) and the open intervals where the function is concave up or down:

$$g(x) = x^4 - 6x^3 + 12x + 7$$

7. Find the point on the graph of $y = x^2$ that is closest to the point $(0,1)$.
8. The concentration C of a certain chemical in the bloodstream t hours after injection into muscle tissue is given by $C = \frac{2t}{t^2 + 1}$, $t \geq 0$. When is the concentration greatest?
9. Find the number of units x that will minimize the average cost if
- $$C(x) = 0.02x^2 + 14x + 800$$

- 10. A company has a demand function for producing x units of a product modeled by $p = 20 - \frac{x}{10}$ and a total cost function modeled by $C = 10 + 5x$. Find the level of production that maximizes profits.**