

QUIZ #3 (SECTIONS 3.1, 3.2, 3.3, 3.6)

MATH 121 – FALL 2003 – KUNIYUKI
105 POINTS TOTAL, BUT 100 POINTS = 100%

Show all work, simplify as appropriate, and use “good form and procedure” (as in class).

Box in your final answers; write units where appropriate!

No notes or books allowed. A scientific calculator is allowed.

1) Sketch the graph of $f(x) = x^4 - 4x^3 + 3$. You must:

- Find and label all points at critical numbers and inflection points (if any).
- Classify all points at critical numbers as relative maximum points, relative minimum points, or neither.
- Find the y-intercept.
- Have your graph correctly show where f is increasing / decreasing, and where f is concave up / concave down.
- Show all steps, as we have done in class.

(30 points)

YOU MAY USE THE BACK OF THIS SHEET!

1 cont.)

YOU MAY USE THE NEXT SHEET!

2) Find all critical numbers of $f(x) = \frac{1}{x^2 + 6x}$. Remember to clearly box in your answer(s). (6 points)

3) True or False: If $f''(6) = 0$, then the graph of f must have an inflection point at $x = 6$. Circle one: (2 points)

True

False

4) True or False: The Second Derivative Test can be used to show that a point on the graph of f is neither a relative maximum point nor a relative minimum point. Circle one: (2 points)

True

False

5) Is the graph of $f(x) = \sqrt{x^3}$ concave up or concave down at $x = 9$? Show work!
(6 points)

6) Find the absolute maximum and absolute minimum values of $f(x) = -3x^2 + 60x + 7$ on the interval $[3, 20]$ and label them "A.Max.Value" and "A.Min.Value." As you show your work, list all of the appropriate candidates for these values and only those, based on our discussion in class. (9 points)

7) For the equation $xy^2 - 3x^5 + y^3 = 7$, use implicit differentiation to find $\frac{dy}{dx}$.
(14 points)

8) Your company sells posters of Arnold Schwarzenegger. Fixed costs are \$300. Each poster costs \$4 to make. The price function is $p(x) = 346 - 3x$ in dollars, where x is the number of posters produced and sold. (20 points total)

a) Find the profit function, $P(x)$. Your answer must be in simplest form.

b) How many posters should be produced? Verify that this gives us the absolute maximum profit, as we have done in class.

c) What is your maximum profit?

- 9) A company's demand equation is $x = \sqrt{58 - p^2}$, where p is the price in dollars and x is the quantity consumers will demand at that price. Find $\frac{dp}{dx}$ when $p = 3$, and interpret your answer. (16 points)