

**Math 261: Calculus - Test # (Part one)**  
Los Angeles City College - Spring 2005

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Name \_\_\_\_\_

1. Check whether the assumptions of the mean value theorem are satisfied and if they are, then find values of  $c$  for  $f(x) = 4\sqrt{2+x} - x^2$  where  $x \in [0, 3]$  (15 pts.)
2. Find all relative and absolute extrema for  $f(x) = \frac{1}{\sqrt{9-x^2}}$  for  $x \in [0, 2]$  (15 pts.)
3. For the following polynomial function  $f(x) = x^5 - 5x^3 + 20x$ , find: (25 pts.)
  - a. All critical points
  - b. Find intervals of increasing and decreasing
  - c. All inflection points and intervals of concavity
  - d. All x & y intercepts
  - e. Graph this function
4. For the following Rational function  $f(x) = \frac{x^2 - 2x - 4}{x - 2}$ , find: (25 pts.)
  - a. All asymptotes
  - b. All critical points and intervals of increasing and decreasing
  - c. All inflection points and intervals of concavity
  - d. All x & y intercepts
  - e. Graph this function
5. Find all the asymptotes for the following function  $f(x) = \frac{\sqrt{x^4-4}}{3x^2-1}$  (15 pts)

6. For the following function  $f(x) = 2x^{\frac{5}{3}} - 5x^{\frac{4}{3}}$ , find: (25 pts.)
- All critical points
  - Find intervals of increasing and decreasing
  - All inflection points and intervals of concavity
  - All x & y intercepts
  - Graph this function
7. Sketch a possible graph for  $f(x)$  with the following given information: (15 pts.)
- $f'(x) > 0$  for  $x \in (1, 2)$  &  $(2, 4)$  &  $(4, \infty)$
  - $f'(x) < 0$  for  $x \in (-\infty, 1)$
  - $f'(x) = 0$  at  $x = 4$  &  $f'(x)$  : *undefined* for  $x = 1$
  - $f''(x) < 0$  for  $x \in (-\infty, 1)$  &  $(1, 4)$
  - $f''(x) > 0$  for  $x \in (4, \infty)$
  - $f''(x) = 0$  at  $x = 4$
8. For the following trigonometric function  $f(x) = 2 \cos 2x - \cos x$ , find: (25 pts.)
- All critical points
  - Find intervals of increasing and decreasing
  - All inflection points and intervals of concavity
  - All x & y intercepts
  - Graph this function
9. A cylindrical can is to be made to hold 1 gallon of oil. Find the dimensions that will minimize the cost of the metal to manufacture the can? (20 pts.)
10. A company estimates that the cost (in thousands of dollars) of producing x items is  $C(x) = 2,600 + 2x + 0.01x^2$  & the demand function is given by  $p(x) = 500 - 0.001x$  (15 pts.)
- Find the marginal and average cost function for  $x = 1000$
  - Find the Revenue and profit functions
  - Find the number of units that corresponds to maximum profit.