

MATH 121, Calculus I — Exam III (Spring 2014)

Name: _____

KU ID No.: _____

This exam has a total value of 100 points. There are 8 problems in total to be solved. Four of the problems are worth 10 points each, the remaining four problems are worth 15 points each. This is strictly a closed-book exam. If necessary, you may use a calculator. **Be sure to show all work.**

Score

# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	Total

1. **[10 points]** If V is the volume of a cube with edge length x and the cube expands as time passes, find dV/dt in terms of dx/dt .

Answer:

2. **[15 points]** A particle moves along the curve $y = \sqrt{1 + x^3}$. As it reaches the point $(2, 3)$, the y -coordinate is increasing at a rate of 4 cm/s. How fast is the x -coordinate of the point changing at that instant?

Answer:

3. **[15 points]** Find the local and absolute maximum and minimum values of $f(x) = 12 + 4x - x^2$ on the interval $[0, 5]$

Answer:

4. **[10 points]** Suppose that f'' is continuous on $(-\infty, \infty)$.
- (a) If $f'(2) = 0$ and $f''(2) = -5$, what can you say about f ?
 - (b) If $f'(6) = 0$ and $f''(6) = 0$, what can you say about f ?

Answer:

5. [10 points] Evaluate the limit $\lim_{t \rightarrow 0} \frac{e^{3t} - 1}{t}$

Answer:

6. [15 points] Find the dimensions of a rectangle with perimeter 100m whose area is as large as possible.

Answer:

7. **[10 points]** Use Newton's method with $x_1 = -1$ to find x_2 , the second approximation of the root to the equation $x^3 + x + 3 = 0$.

Answer:

8. **[15 points]** Find the antiderivative $F(x)$ of $f(x) = (x + 1)(2x - 1)$.

Answer: