MATH 112
Exam II
February 24, 2011

Name ______________________________

Student ID #____________________ Section ____________________

HONOR STATEMENT

"I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam."

SIGNATURE:______________________________

1	12	
2	6	
3	13	
4	19	
Total	50	

- Please check that your exam contains four problems on three pages.
- Turn your cell phone OFF and put it away for the duration of the exam.
- You may not listen to headphones or earbuds during the exam.
- Unless otherwise indicated, you must use the methods of this course and show all of your work. The correct answer with little or no supporting work may result in no credit. If you use a guess-and-check method or read a value from a graph on your calculator when an algebraic method is available, you may not receive full credit.
- There are multiple versions of this exam. You've signed an honor statement. Don't cheat.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!

1. (12 points) Compute the indicated derivative. DO NOT SIMPLIFY.

   (a) $y = xe^{x^3} + \ln(2 + 4x^5)$

   $\dfrac{dy}{dx} =$

   (b) $g(t) = \dfrac{e^{3t-4}}{\sqrt{2t+9}}$

   $g'(t) =$

   (c) $Q(r, s) = \left(\frac{9s}{r}\right)^3 [r \ln(s)]^4$

   $Q_s(r, s) =$

2. (6 points) Let $f(x, y) = 40 + xy + \dfrac{1}{x} + \dfrac{125}{y}$. Find all points (x, y) at which $f(x, y)$ may have a local optimum.

ANSWER: (list all pairs) $(x, y) =$____________________

3. (13 points) You're ordering desserts for your company's annual shareholders' meeting. The Something Special Bakery has two specialty items: Café Latté Cupcakes and Key Lime Tartlets. Each box of Cupcakes costs \$30 and serves 12. Each box of Tartlets costs \$24 and serves 10. The bakery can provide no more than 22 boxes of Tartlets on the day of your event. You may spend up to \$1098 on the desserts.

   Let x be the number of boxes of Cupcakes you order and y be the number of boxes of Tartlets. How many boxes of each should you order to maximize the number of servings and how many can you serve? (NOTE: The Bakery is willing to sell a fraction of a box. So, x and y need not be whole numbers.)

ANSWER: $x =$____________________boxes, $y =$____________________boxes,

for a maximum of ____________________servings

4. (19 points) You sell Gizmos. Your total revenue and total cost are given by the functions $TR(q) = -2q^2 + 199.1q$ and $TC(q) = 0.01q^3 - 2.405q^2 + 200q + 20$, where q is in thousands of Gizmos and TR and TC are both in thousands of dollars.

   (a) Find the largest interval on which $MR(q)$ is positive.

   ANSWER: from $q =$____________ to $q =$____________ thousand Gizmos

   (b) Is $TC(q)$ concave up or concave down at $q = 100$?

   ANSWER: (circle one) concave up concave down

   (c) Recall that $FC = TC(0)$, $TC(q) = VC(q) + FC$, and $AVC(q) = \dfrac{VC(q)}{q}$. Find all critical numbers of $AVC(q)$.

   ANSWER: (list all) $q =$__________________ thousand Gizmos

   (d) Let $P(q)$ denote the profit (in thousands of dollars) at q thousand Gizmos. The critical numbers of $P(q)$ are $q = 1.16$ and $q = 25.84$ thousand Gizmos. Determine whether each critical number gives a local minimum of $P(q)$, a local maximum of $P(q)$, or neither.

   ANSWER: $q = 1.16$ gives a (circle one) local min local max neither
   $q = 25.84$ gives a (circle one) local min local max neither