QUIZ 5 (B13)
Thursday, April 3, 2008

Duration: 25 minutes.

Supporting material:

Using **any** supporting material (e.g. notes, books, calculators, cellphones) is **strictly forbidden**, and will be dealt with to the fullest extent by the relevant University policies. To clarify, you are allowed to have only writing tools and food with you during the examination.

Instructions:

- Write your name and student number on each page that you submit, including this sheet, which you are expected to return.

- The maximum mark on this quiz is 25.

- Show and explain your work!

Exercise 1. *Let* $f(x) = \dfrac{2}{(x-1)(x-3)}$.

Then $f'(x) = \dfrac{-4x+8}{(x-1)^2(x-3)^2}$, *and* $f''(x) = \dfrac{4(3x^2 - 12x + 13)}{(x-1)^3(x-3)^3}$.

9   (a) *Compile the following information about* $f(x)$, *and its graph. Give answers ONLY. (Write "none" if the item does not exist.)*

    (i) *Domain;*
    (ii) y*-intercept;*
    (iii) *Equation(s) of horizontal asymptote(s);*
    (iv) *Equation(s) of vertical asymptote(s);*
    (v) *Critical numbers of* $f(x)$;
    (vi) *Open interval(s) where* $f(x)$ *is increasing;*
    (vii) *Open interval(s) where* $f(x)$ *is decreasing;*
    (viii) *Open interval(s) where* $f(x)$ *is concave up;*
    (ix) *Open interval(s) where* $f(x)$ *is concave down;*
    (x) x*- and* y*-coordinates of any local maxima;*
    (xi) x*- and* y*-coordinates of any local minima;*
    (xii) x*-coordinate of any inflection points.*

6   (b) *Sketch the graph of the function* $f(x)$ *labeling all asymptote(s), relative extrema, inflection point(s).*

Exercise 2. *A manufacturer produces metal boxes (with top and bottom) with square base.*

2   (a) *Given that* 24 *square feet of metal is available for each box, find the relationship between the height h of the box and the side length a of its base.*

2   (b) *Express the volume of the box as a function of one variable.*

4 +1   (c) *Determine the dimensions of the box that maximize the volume. Remember to justify why your answer is the absolute maximum.*

1   (d) *Determine the maximal volume of the box.*

Exercise 3. *Find each of the following indefinite integrals:*

2   (a) $\displaystyle\int (3^{-2x} + 2x^3)dx;$

3   (b) $\displaystyle\int \frac{2x^4 - 7x}{x^3}dx.$

GOOD LUCK!!!!