King Fahd University of Petroleum & Minerals Section # Serial #
Department of Mathematics & Statistics ID #
MATH 132/ Exam II/ 121 Name

Write clearly, explain and simplify your answers

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1. **[6pts]** Use logarithmic differentiation to find y' if $y = x^{x^4}$

2. **[6pts]** Find $y''(-1)$ if $y = (x^2 - 3x + 1)^2$

3. **[6pts]** The demand equation for a product is given by $3p + 2q = 300$, where p is the unit price when q units are produced. How many units should be produced to maximize revenue and what is the value of this maximum revenue?

4. **[12pts]** For the function $f(x) = 2x^3 - 9x^2 + 12x + 7$ determine
(a) the intervals where it is increasing and where it is decreasing
(b) each relative maximum and relative minimum
(c) the intervals where it is concave up and where it is concave down
(d) the x-coordinate of each inflection point

5. **[6pts]** Using differentials, find an approximation of $\sqrt[5]{30}$

6. **[8pts]** The cost function c of producing q units of a product is $c = 0.05q^2 + 5q + 500$, where $50 \leq q \leq 200$. How many units should be produced to minimize the average cost per unit?

7. [**8pts**] Evaluate:

(a) $\int x^2 \ 4^{5x^3+7} dx$

(b) $\int_0^1 (4x-6)(3x-x^2)^4 dx$

8. [**8pts**] Evaluate:

(a) $\int \dfrac{3x^2 - 4x + \sqrt{x}}{x^3} dx$

(b) $\int \dfrac{x^2 - 3x + 4}{x - 2} dx$