**King Fahd University of Petroleum and Minerals**
**Department of Mathematics & Statistics**
**Math101.15**
**Semester 101**
**Quiz (5)**

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**Name:**
**ID#:** **Serial#:**

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1. Find the absolute maximum and minimum values of $f$ on the given interval:

$$f(x) = x\sqrt{4 - x^2}, \qquad [-1,2]$$

2. Let $f(x) = 1 - x^{2/3}$. Show that $f(-1) = f(1)$ but there is no number $c \in (-1,1)$ such that $f'(c) = 0$. Why does this not contradict Rolle's Theorem?

3. Verify that $f$ satisfies the hypothesis of the Mean Value Theorem on the given interval. Then find all numbers ***c*** that satisfy the conclusion of the MVT.

$$f(x) = \frac{x}{x+2}, \qquad [1,4]$$

4. For what values of ***a*** and ***b*** does the function

$$f(x) = a\,x\,e^{bx^2}$$

have the maximum value $f(2) = 1$?

5. For the function:

$$f(x) = 2\cos x + \cos^2 x, \qquad 0 \le x \le 2\pi$$

(a) Find the intervals of increase and decrease.
(b) Find the local maximum and minimum values.
(c) Find the intervals of concavity and inflection points.
(d) Sketch the graph of $f$ .

6. Evaluate:

(a) $\lim_{x\to 0} (\cos 2x)^{3/x^2}$

(b) $\lim_{x\to 0^+} \left( \frac{1}{2x} - \frac{1}{x(e^{3x}+1)} \right)$

Good Luck
Khaled Al-Anezy