King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
Math 101 Major Quiz 1 (Term 142)

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

Question 1[4 points]: Use the Intermediate Value Theorem to show that the functions have an intersection point:

$$f(x) = e^{-x}, \quad \textit{and} \quad g(x) = x^2.$$

Question 2[6 points]: Graph a function $y = f(x)$ with the following properties:

1. $\lim_{x\to\infty} f(x) = 2$.
2. $\lim_{x\to 4^+} f(x) = \infty$.
3. $f(4) = 2$.
4. f has a jump discontinuity at $x = 0$.
5. $f'(-2) = 0$.
6. $y = 0$ is a horizontal asymptote.

Question 3[5 points]: Find the following limits, if any exists

1. $\lim_{x\to 0} \frac{x}{1-cos(x)}$

2. $\lim_{x\to \pi/4} \ln(\frac{cos(x)+sin(x)}{cot(x)+tan(x)})$

Question 4[5 points]: Determine all asymptotes of the function

$$f(x) = \frac{x^3+1}{x^2-1}$$