MATH101, MIDTERM 1

Sayfa 1

1. Let the function $f(x) = 1 + e^{-x^2}$ be given.
   (a) (4 pt) Find the domain of $f(x)$.
   (b) (6 pt) Determine if $f(x)$ is even, odd or neither. Give reason for your answer.
2. (10 pt) Evaluate the limit (Do not use the L'Hopital's Rule):
$$\lim_{x\to 0} \frac{x + x\cos x}{\sin x \cos x}.$$
3. (15 pt) Graph the function $f(x) = \sqrt{-x} + 2$ using the techniques of shifting and reflecting. Write each step you used clearly.

Sayfa 2

4. Evaluate the following limits (Do not use the L'Hopital's Rule):
   (a) (8 pt) $\lim_{x\to 0} \dfrac{x}{\sqrt{1+3x} - 1}$
   (b) (7 pt) $\lim_{x\to 1^-} \dfrac{\sqrt{2x}(x-1)}{|x-1|}$
5. (a) (8 pt) Evaluate $\log_{10} 25 + \log_{10} 4$.
   (b) (7 pt) Let the function $H(x) = \sqrt[3]{\tan^{-1} x}$ be given. Find the functions f and g so that $H = f \circ g$.

Sayfa 3

6. (10 pt) Show that $\lim_{x\to 0}(x^2 + x)\sin\dfrac{1}{x} = 0$ by using the Sandwich Theorem.
7. (10 pt) Evaluate the limit:
$$\lim_{x\to \frac{1}{4}} \sin^{-1}\left(\log_2 4^{-x}\right).$$
8. (15 pt) For what values of a and b is the function
$$f(x) = \begin{cases} ax + b & \text{if } x \le 0 \\ x^2 + 3a - b & \text{if } 0 < x \le 2 \\ 4x - 5 & \text{if } x > 2. \end{cases}$$
continuous at every x.