Math 101 Section 29 & 37 Test I (Term 141)

Name : ..... **Id** #..... **List no**: .....

1. Find an equation for the tangent to $f(x) = \dfrac{1}{x+1}$ at $x = 2$.

2. Find the limit, if it exists:

a) $\lim\limits_{x \to \frac{\pi}{2}^+} \sqrt{\dfrac{\cos x}{1+x}}$

b) $\lim\limits_{x \to -3^-} \dfrac{|x^2+3x|}{(x+3)}$

c) $\lim\limits_{x \to 0} \dfrac{\sqrt{2x+9}-3}{x}$

d) $\lim\limits_{x \to \infty} \dfrac{x-\sqrt{x}}{x}$

e) $\lim\limits_{x \to 1} \dfrac{\sin(\sqrt{x}-1)}{(x-1)}$

f) $\lim\limits_{h \to 0} \dfrac{\cosh -1}{\sinh}$

3. Prove that $\lim_{x \to 0^+} \sqrt{x} \sin \frac{1}{x} = 0$.

4. For what value of b is $f(x) = \begin{cases} \frac{x-b}{b+1} & x < 0 \\ x^2 + b & x \geq 0 \end{cases}$ continuous for every x?

5. Let $f(x) = \frac{x^2+1}{x-1}$. Find all asymptotes. Graph show details.