

Mathematical Analysis (470-2110/06)

**Exercises – Part 6**

The problems given below are to practise for the semester tests or the final exam.

**Limit of Function, L'Hospital Rule****Find a limit of a function.**

1.  $\lim_{x \rightarrow +\infty} \frac{\sqrt[3]{x} \ln x}{x}$ ;
2.  $\lim_{x \rightarrow 0^+} x^3 \ln x$ ;
3.  $\lim_{x \rightarrow 0} \left( \frac{1}{\sin x} - \frac{1}{e^x - 1} \right)$ ;
4.  $\lim_{x \rightarrow 0} \frac{\ln(\cos 3x)}{x^3 - x^2}$ ;
5.  $\lim_{x \rightarrow 0} \frac{\ln(x^4)}{\tan x}$ ;
6.  $\lim_{x \rightarrow \pi} (\pi - x) \tan \frac{x}{2}$ ;
7.  $\lim_{x \rightarrow 1} \frac{x^3 + x - 2}{\cos \frac{\pi x}{2} + \sin \pi x}$ ;
8.  $\lim_{x \rightarrow 0} (e^x + 3x)^{\frac{1}{x}}$ ;
9.  $\lim_{x \rightarrow 0^+} x^{\tan x}$ ;
10.  $\lim_{x \rightarrow 1^+} \left( \frac{1}{x-1} \right)^{\ln x}$ ;
11.  $\lim_{x \rightarrow 0} \left( 1 - \sin x \right)^{\frac{1}{x}}$ ;
12.  $\lim_{x \rightarrow 0^+} \left( \tan x \right)^{\frac{1}{\ln x}}$ .