Serial No.:_____ Student Name:_____ Student Number: _____

Instructor: M. Z. Abu-Sbeih Math 101- Q4 Date: 14-12-2014

SHOW ALL YOUR WORK. NO CREDITS FOR ANSWERS NOT SUPPORTED BY WORK.

(1) (16 points) Consider the function $f(x)=\frac{1}{x}+\ln(x+2)$

1. Find the domain of $f(x)$.

2. Find the critical numbers if any exists.

3. Find increasing and decreasing intervals

4. Find local extrema if any exists.

5. Does the function have absolute extrema? Explain why.

(2) (24 points) Find the limit if it exists

(a) $\lim_{x\to 1} \frac{x-1}{\ln x-\sin \pi x}$

(b) $\lim_{x\to \infty} \left(1+\frac{1}{x^2}\right)^x$

(c) $\lim_{x\to \infty} \frac{\sqrt{x+2}}{\sqrt{x}+5}$