

Homework 9- MATH 2L03

Winter 2016

1. Evaluate the following limits

a) $\lim_{x \rightarrow \infty} \frac{\ln \sqrt[4]{x}}{x^3}$

d) $\lim_{x \rightarrow 0} \frac{10^x - 5^x}{4^x - 2^x}$

b) $\lim_{x \rightarrow \infty} \frac{e^x - x^2 - 1}{x^2}$

e) $\lim_{x \rightarrow \infty} \left(1 + \frac{2}{x}\right)^{3x}$

c) $\lim_{x \rightarrow 0} \frac{\cos 3x - \cos 2x}{x^2}$

2. If f' is continuous, $f(6) = 1$ and $f'(6) = 3$, evaluate

$$\lim_{x \rightarrow 0} \frac{f(6 + 3x) - f(6 + x)}{2x}$$

3. Explain why the following integrals are improper

(a) $\int_1^2 \frac{x}{x-1} dx$

(c) $\int_1^\infty \frac{1}{x} dx$

(b) $\int_1^\infty \frac{1}{1+x^2} dx$

(d) $\int_0^\pi \tan x dx$

4. Determine whether each integral is convergent or divergent. Evaluate the integrals that are convergent:

(a) $\int_0^\infty x e^{-x} dx$

(c) $\int_0^5 \frac{w}{w-2} dw$

(b) $\int_1^\infty \frac{\ln x}{x} dx$