

# Assignment 16 (5/15)

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## Problem 1

Problems 12.2.(30, 32, 42).

## Problem 2

Consider a real number  $a$  and consider the sequence:

$$a, \cos(a), \cos(\cos(a)), \cos(\cos(\cos(a))), \dots$$

Does this sequence converge? If it does, find the limit.

## Problem 3

Suppose a sequence  $a_n$  converges to  $l$ . Define another sequence  $\{m_n\}$  by

$$m_n = \frac{a_1 + a_2 + \dots + a_n}{n}$$

Prove that  $m_n \rightarrow l$ .

## Problem 4

Find

$$\lim_{x \rightarrow \infty} x e^{-x^2} \int_0^x e^{x^2} dx$$

## Problem 5

Suppose  $S$  is a nonempty set which is bounded below. let  $B$  be the set of lower bounds of  $S$ . Prove that  $\text{lub}(B) = \text{glb}(S)$ .

## Problem 6

Find whether following integrals converge, and if so, evaluate them:

(a)  $\int_0^9 \frac{1}{(x-1)^{2/3}} dx$

(b)  $\int_0^1 \frac{1}{1-x^2} dx$

(c)  $\int_1^\infty \frac{\sin(\pi/x)}{x^2} dx$

(d)  $\int_0^\infty e^{-rx} \cos(2x) dx, r \in \mathbb{R}$