Vietnam National University of Agriculture
Department of Mathematics

June 12, 2016

FINAL EXAM MATH 17B- No.1
Duration 75 minutes

Unauthorized materials

Exercise 1. Evaluate the following integrals.

a) [2.0 pt] *(First make an appropriate substitution, and then use IBP)* $\int_0^3 \sqrt{x+1}\ln\sqrt{x+1}dx$.

b) [1.0 pt] $\int_1^\infty \frac{1}{x^{\frac{3}{2}}}dx$.

Exercice 2. Denote by $L(t)$ the length of a fish at time t and assume that the fish grows according the von Bertalanffy equation

$$\frac{dL}{dt} = 2.2\ (25 - L),\ \text{with } L(0) = 5.$$

a) [1.0 pt] Solve the equation.

b) [1.0 pt] Find the length of the fish at time $t = 2$.

c) [1.0 pt] Find the asymptotic length of the fish, that is, find $\lim_{t\to\infty} L(t)$.

Exercice 3. Let $N(t)$ denote the size of a population at time t that satisfies the logistic equation

$$\frac{dN}{dt} = 4N(1 - \frac{N}{40}) - 2N := g(N),\ \text{for } N \geq 0.$$

a) [1.0 pt] Graph $N(t)$.

b) [3.0 pt] Find all equilibria of the equation and determine their stability using both (i) the graphical approach, and (ii) the analytical approach.

Edited by Quang Sang Phan

Reviewed by

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FINAL EXAM MATH 17B- No.2
Duration 75 minutes

Unauthorized materials

Exercise 1. Evaluate the following integrals

a) [2.0 pt] *(First make an appropriate substitution, and then use IBP)* $\int_1^4 \sqrt{x} \ln \sqrt{x} dx$.

b) [1.0 pt] $\int_1^\infty \frac{1}{x^{\frac{4}{3}}} dx$.

Exercice 2. Denote by $L(t)$ the length of a fish at time t and assume that the fish grows according the von Bertalanffy equation

$$\frac{dL}{dt} = 1.8\ (30 - L), \text{ with } L(0) = 8.$$

a) [1.0 pt] Solve the equation.

b) [1.0 pt] Find the length of the fish at time $t = 3$.

c) [1.0 pt] Find the asymptotic length of the fish, that is, find $\lim_{t\to\infty} L(t)$.

Exercice 3. Let $N(t)$ denote the size of a population at time t that satisfies the logistic equation

$$\frac{dN}{dt} = 3N(1 - \frac{N}{30}) - 2N := g(N), \text{ for } N \geq 0.$$

a) [1.0 pt] Graph $N(t)$.

b) [3.0 pt] Find all equilibria of the equation and determine their stability using both (i) the graphical approach, and (ii) the analytical approach.

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