

Eastern University, Sri Lanka

Faculty of Commerce and Management

First Year First Semester Examination in Bachelor of Business Administration
and Bachelor of Commerce - 2017/2018

(July-August 2019)

Proper/Repeat

COM 1013 Business Mathematics

Answer all questions

Time: Three Hours

1. (a) Simplify the following:

i. $\frac{\sqrt[3]{343x^{3/2}}}{x^{1/2}}$;

ii. $(81y^4)^{1/4} \times (32x^{10})^{2/5} \div (8x^{-3})^{2/3}$.

(b) Solve the following equations:

i. $3^x \times 3^{x+1} = 27$;

ii. $2^x + 4^{x+1} = 3$.

(c) Factorize the following:

i. $x^3 - 729$;

ii. $2xyz^2 - 4xyz + 2xy$.

2. (a) Solve the following equations.

i. $\log_3 a(a^2 - 1) - \log_3(a - 1) - \log_3(a + 1) = \log_3 27$.

ii. $2\log_2 x = 3 + \log_2(x + 6)$.

(b) If, $x^2 + y^2 = 102xy$, then show that $2\log\left(\frac{x-y}{10}\right) = \log x + \log y$.

(c) If one deposits \$10,000 into an account paying 6% annual interest compounded quarterly, how much money will be in the account after 5 years?

3. (a) Evaluate the following limits:

i. $\lim_{x \rightarrow 5} \frac{x^2 - 25}{x - 5}$;

iii. $\lim_{x \rightarrow 2} \frac{x^2 - 4}{\sqrt{x^2 - 3} - 1}$;

v. $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 + x - 6}$.

ii. $\lim_{x \rightarrow \infty} \frac{1 + 4x^2 + 20x^3 - 1}{3 + x^3 + 3x^4}$

iv. $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x - 1}$;

(b) Differentiate the following:

i. $y = x^3 - 4x^2 + 5x + 7$;

ii. $y = e^x \cos 2x$;

iii. $y = \ln(x^2 + 1)$;

iv. $y = \frac{x}{1 + x}$;

v. $y = (2 + \sin x)^2$.

4. (a) Find the maximum and the minimum points of the curve $y = x^3 - 3x + 2$.

(b) The total cost function of a product is given by

$$C(x) = x^3 - \frac{615x^2}{2} + 15750x + 18000,$$

where x is the number of units produced. Determine the number of units that must be produced to minimize the total cost.

5. (a) Find the value of the following integrations:

i. $\int (4x^3 - 2x - 7) dx$;

ii. $\int \frac{2x^3 - x}{\sqrt{x^4 - x^2 + 6}} dx$;

iii. $\int \frac{1}{x(\ln x)^2} dx$;

iv. $\int \frac{x^2}{(4x^3 - 10)} dx$;

v. $\int \frac{3x^3}{x^2 + 2} dx$.

(b) If the marginal revenue function is

$$MR(x) = \frac{4}{(2x + 3)^2} - 1,$$

find the total revenue and the demand function.