

UNIVERSITY OF JAFFNA, SRI LANKA
BACHELOR OF PHARMACY
Second Year First Semester Examination- February 2017
PHAMM2111-Pharmaceutical Mathematics

Date: 30.03.2017 Answer All Questions Time Allowed: One hour

1. (a) Find the value of the discriminant and describe the nature of the roots of the following quadratic equations:

i. $7x^2 - 10x - 5 = 0$;

ii. $25t^2 - 10t = -1$;

iii. $8x^2 - 6x + 3 = 5x^2$.

(b) Use the logarithm laws to write each of the following expression as a single logarithm:

i. $2 \ln(w - 5) - \frac{1}{2} [\ln(x + y) - \ln(x - y)] - 3 \ln z$;

ii. $2(\log 2x - \log y) - (\log 3 + 2 \log 5)$;

iii. $\frac{1}{3} \log_2 r - 2(\log_2 n - 4 \log_2 m)$.

(c) Write down the expression for $\sin(A+B)$ and $\cos(A-B)$. Use the above expressions to find the following:

i. $\sin 225^\circ$;

ii. $\cos 195^\circ$.

(d) Solve the following equations in the domain $0 \leq x < 2\pi$.

i. $6 \cos^2 x = 3 \cos x + 3$;

ii. $\sin^3 x - 5 \sin^2 x + 6 \sin x = 0$.

2. (a) Find the following limits:

i. $\lim_{x \rightarrow -1} \frac{3x - 4}{8x^2 + 2x - 2}$;

ii. $\lim_{x \rightarrow 0} \left[\frac{x^2 + 3x - 1}{x} + \frac{1}{x} \right]$;

iii. $\lim_{x \rightarrow 1} \frac{1 - \cos(x - 1)}{(x - 1)^2}$.

(b) Differentiate the following with respect to x , simplifying your answer where possible:

i. $\frac{(x^2 + x + 1)(4 - x)}{(2x - 1)}$;

ii. $\sqrt{x^2 + 3x + 2}$;

iii. $\sin(x^2 + 3) \cos(\sqrt{x^2 + 1})$.

(c) By making a suitable substitution, find each of the following integrals:

i. $\int 3x^2 \sin(x^3 + 1) dx$;

ii. $\int \frac{2 \sin 3x}{(5 + 3 \cos x)^4} dx$;

iii. $\int \frac{1}{\sqrt{x}(\sqrt{x} + 1)} dx$;

iv. $\int x e^{-3x^2} dx$.

End of Exam