

ASSOCIATION OF CANADA LANDS SURVEYORS - BOARD OF EXAMINERS
WESTERN CANADIAN BOARD OF EXAMINERS FOR LAND SURVEYORS
ATLANTIC PROVINCES BOARD OF EXAMINERS FOR LAND SURVEYORS

SCHEDULE I / ITEM 1
MATHEMATICS

October 2004

Note: This examination consists of 10 questions on 1 page.

Marks

Q. No

Time: 3 hours

Value Earned

1.a)	Given three arbitrary points in the real plane, how can one check for their collinearity?	5	
b)	Given four arbitrary points in space, how can one check for their coplanarity?	5	
2.a)	Given two vectors $(1, 2, 3)^T$ and $(4, -2, -1)^T$, what is the angle between them?	5	
b)	Given two vectors $(2, 1, -3)^T$ and $(1, -2, -1)^T$, what is the unit vector orthogonal to both of them?	5	
3.a)	What is the equation of a circle of radius R with centre at z_0 in the complex plane?	5	
b)	What is the equation of an ellipse with semi-major axis a and semi-minor axis b with centre at the origin in the complex plane?	5	
4.a)	What are the first three terms in the series expansion of $(1 + 2x)^{-1}$ about $x = 0$?	5	
b)	What are the first three terms in the series expansion of $\log_e 2x$ about $x = 1$?	5	
5.a)	Set up the integral to evaluate the circumference of an ellipse with semi-major axis a and semi-minor axis b with centre at the origin.	5	
b)	Set up the integral to evaluate the volume of a spheroid with semi-axes a, b and c with centre at the origin.	5	
6.a)	Given a small matrix $A = [a_{ij}]$ of order 3 with elements $a_{ij} = li - jl$, what is its determinant?	5	
b)	What is the inverse of this matrix A?	5	
7.a)	What is a symmetric matrix B? Give a matrix example of order 3.	5	
b)	What is a skew-symmetric matrix C? Give a matrix example of order 3.	5	
8.a)	Given a quadratic equation $x^2 + 3x + 7$, what are the roots?	5	
b)	Given a cubic equation $x^3 + 2x^2 + 3x - 6$, what are the roots? Hint: $1+2+3-6 = 0$.	5	
9.a)	What is the general solution of $y'' + 4y = 0$, where $y'' = d^2y/dx^2$?	5	
b)	What is the general solution of $z'' - 4z = 0$, where $z'' = d^2z/dx^2$?	5	
10.a)	What is the general equation of a conic section?	5	
b)	What are the possible conic sections using the discriminant function?	5	
Total Marks:		100	