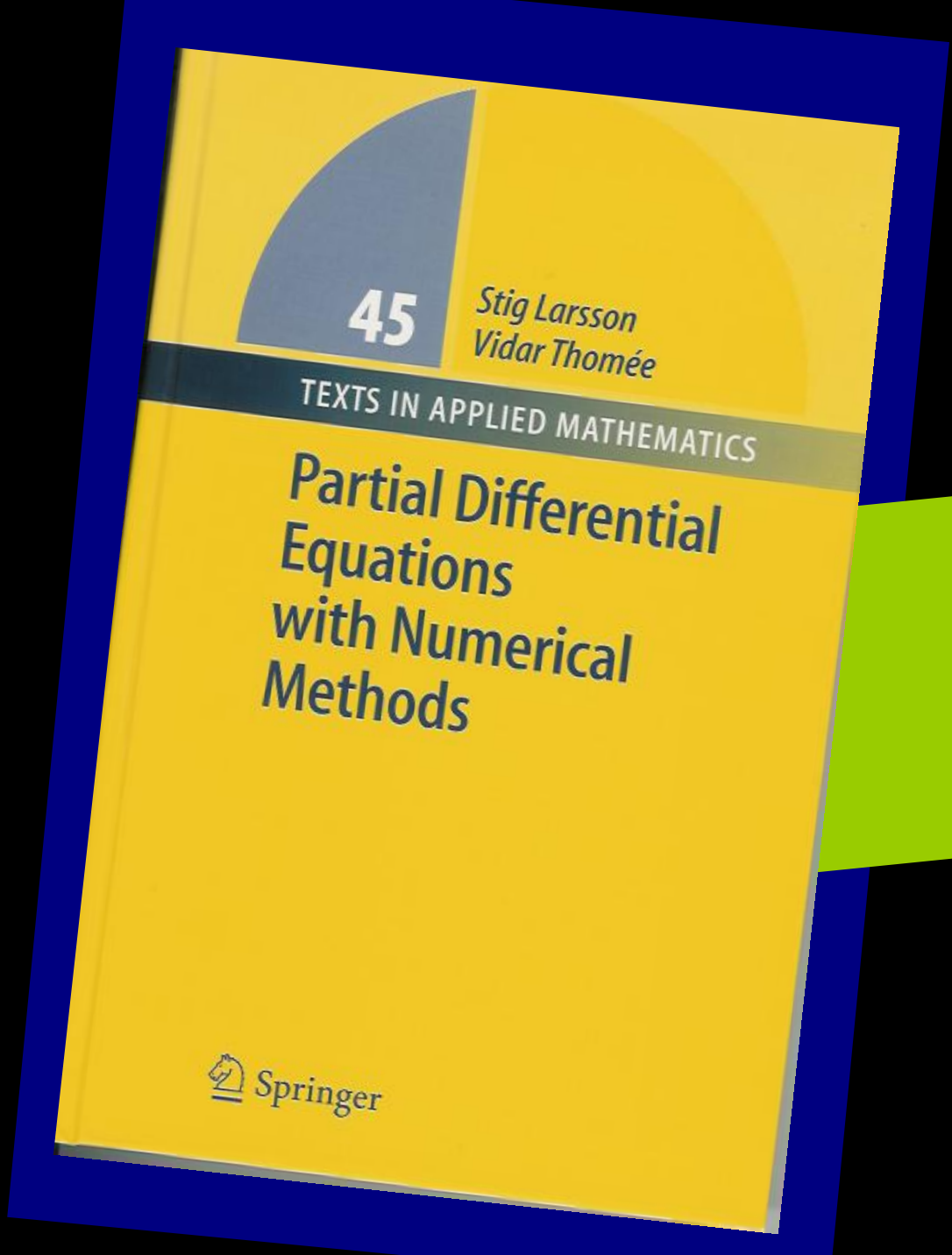

MATH-572

Sec # 1

Term: 081

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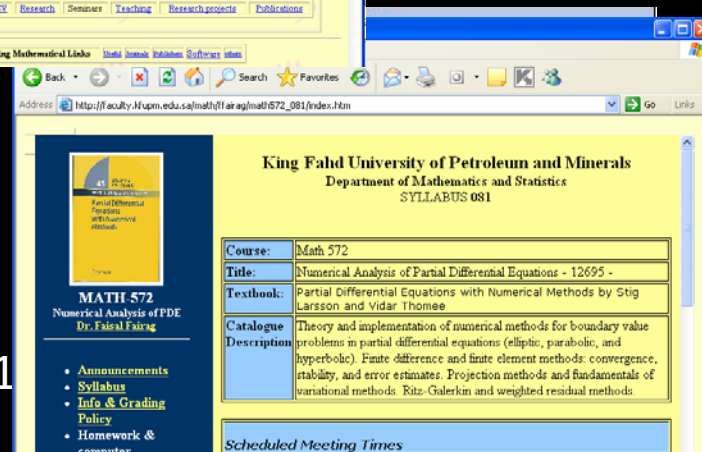

Chapter 1: Finite Difference Method for Poisson Equation

Example : $u(x) = x^2$ Approximate u'(1)

$$u'(x) = \frac{u(x+h) - u(x)}{h}$$ Forward difference

h	$u'(1) \approx$	error
0.1	2.1	0.1
0.01	2.01	0.01
0.001	2.001	0.001

Chapter 1: Finite Difference Method for Poisson Equation

Example : $u(x) = x^2$ Approximate u'(1)

$$u'(x) = \frac{u(x) - u(x-h)}{h}$$ Backward difference

h	$u'(1) \approx$	error
0.1	1.9	0.1
0.01	1.99	0.01
0.001	1.999	0.001

Observation????

Chapter 1: Finite Difference Method for Poisson Equation

Example : $u(x) = x^3$ Approximate u'(1)

$$u'(x) = \frac{u(x+h) - u(x-h)}{2h}$$ Central difference

h	$u'(1) \approx$	error
0.1	3.01	1e-2
0.01	3.0001	1e-4
0.001	3.000001	1e-6

Observation????

Chapter 1: Finite Difference Method for Poisson Equation

Example : $u(x) = x^3$ Approximate u'(1)

h	Error Forward	Error Backward	Error central
0.1	1e-1	1e-1	1e-2
0.01	1e-2	1e-2	1e-4
0.001	1e-3	1e-3	1e-6

Observation????