



King Abdul-Aziz University  
Department of Mathematics

Academic year 1437-1438  
2016-2017

Math 110 (S & E) Syllabus / Term (1)

Book: Calculus Early Transcendentals by James Stewart 7<sup>th</sup> edition

		Lectures			
Chapter Title	Section	Theoretical (Definitions & Theorem)	Examples	Exercises	HW
Appendix	Appendix A Numbers, Inequalities and Absolute Values	<ul style="list-style-type: none"> <li>Intervals (Table )</li> <li>Inequalities</li> <li>Absolute value Properties (1-6)</li> </ul>	4,7 Read 1,2,3,6,8		
	Appendix B Coordinate Geometry and lines	<ul style="list-style-type: none"> <li>Slope of line</li> <li>Point-slope form of the equation of a line.</li> </ul>	4 Read 7,8	35	
	Appendix D Trigonometry	<ul style="list-style-type: none"> <li>Angles (convert formula)</li> <li>Trigonometric functions</li> <li>Trigonometric identities,6-11,15.</li> <li>Graphs of the trigonometric functions (sin,cos,tan only) (domain &amp; range of all).</li> </ul>	1,4	4,33	1-12(odd) 29- 34(odd)

Ch1: Functions and Models

<p>1.1 Four ways to represent a function</p>	<ul style="list-style-type: none"> <li>• Definition: Function, Domain and Range of a (polynomial, absolute, rational, radical of first and second degree) Functions-</li> <li>• Graphs of Functions and vertical line test.</li> <li>• Piecewise defined functions.</li> <li>• Symmetry (Odd &amp; even) functions.</li> <li>• Increasing and Decreasing Functions</li> </ul>	<p>2,6,7,8,11 <b>Read 1</b></p>	<p>9,31,33,3 4,76, 38,42,45.</p>	<p>7-10,32- 34,43, 47,73-78</p>
<p>1.2 Mathematical Models: A Catalog of essential functions</p>	<ul style="list-style-type: none"> <li>• Essential functions (Polynomials, power, rational, algebraic, trigonometric, exponential and logarithmic)</li> </ul>	<p>5</p>	<p>2</p>	<p>1</p>
<p>1.3 New functions from old functions</p>	<ul style="list-style-type: none"> <li>• Transformation of functions. <ul style="list-style-type: none"> <li>i) Vertical and horizontal shifts.</li> <li>ii) Vertical and horizontal reflecting.</li> </ul> </li> <li>• Combination of functions (<math>f \pm g</math>, <math>f \cdot g</math>, <math>f/g</math>, Composite Functions) and their domain.</li> </ul>	<p>1,2,3(b), 6-9</p>	<p>1(a-f) <b>*Solve it for <math>y=e^x</math> (or <math>y=x^2</math>)</b> <b>*Sketch the graph of</b> <math>y =  \cos x </math> <math>y =  \cos x  + 3</math> <math>y = \cos\left(x - \frac{\pi}{2}\right)</math> <b>Then find the domain and range</b></p>	<p>29-37(odd),39,45 <b>*try to sketch</b> <math>y = \cos x - 3</math> <math>y = 2 + \cos x</math> <math>y =  \sin x </math> <math>y =  \sin x  + 3</math> <b>Then find the domain and range</b></p>
<p>1.5 Exponential Functions</p>	<ul style="list-style-type: none"> <li>• Laws of Exponents</li> <li>• The Number e.</li> </ul>	<p>1</p>	<p>2,13,14,1 9,20</p>	<p>1,3,17</p>
<p>1.6 Inverse Functions and Logarithms</p>	<ul style="list-style-type: none"> <li>• Definition1: (1-1) &amp; horizontal line test.</li> <li>• Definition 2: Inverse Functions.</li> <li>• How to find the inverse function.</li> <li>• Logarithmic functions</li> <li>• Natural logarithm.</li> <li>• Graphs and growth of natural logarithm</li> <li>• Inverse of Trigonometric Functions</li> </ul>	<p>1,2 4-13 <b>Read 3,6</b> <b>Prove that the function</b> <math>y = \sqrt[3]{\frac{x+2}{2}}</math> <b>is 1-1 by def.</b></p>	<p>22,23, 37(b),40, 48(a) ,51(a,b), 53(a), 57, 64,68.</p>	<p>21-26(odd) 35-41(add) 52</p>

Ch2: Limits and derivatives	2.2 The Limits of a Functions	<ul style="list-style-type: none"> <li>• Definition1-6</li> <li>• Fig17</li> <li>• One-sided limits</li> <li>• Infinite limits (vertical asymptote)+limit of trigonometric function(by theorem)*</li> <li>•</li> </ul>	1,7-10	9,12 35,38	4,7,8,11
	2.3 Calculating Limits Using the Limits Laws	<ul style="list-style-type: none"> <li>• The Limits Laws</li> <li>• Theorem1,2</li> <li>• The squeezed theorem.</li> <li>• P.192 relation 2, p.193 relation 3</li> </ul>	2(a)-9,11 p. 196 5,6	15,23,28, 29,57 40,46 42, ,45 ,47, 48	12, 19, 20,22,25, 27, 31, 32,35-37, 39
	2.5 Continuity	<ul style="list-style-type: none"> <li>• Definition1: Continuity at A number.</li> <li>• Definition2: Continuity from the right and from the left</li> <li>• Definition3: Continuity on an interval.</li> <li>• Theorem4-10</li> </ul>	2(a-c),6,8,9, 10 Read5,7	3,45	17,20,21,25 , 38, 41,45
	2.6Limits at infinity	<ul style="list-style-type: none"> <li>• Definition1-3</li> <li>• Infinite limits at infinity</li> <li>• Theorem</li> <li>• <math>\lim_{x \rightarrow \infty} (ax^n)</math> if n odd or even</li> </ul>	1-11	34,43	19,26,33, 35 , 43, 44
	2.7 Derivatives and rates of change	<ul style="list-style-type: none"> <li>• Tangents</li> <li>• Definition1-2</li> <li>• Derivatives</li> <li>• Definition 4</li> </ul>	1,4,5		
	2.8 The Derivatives as a Function	<ul style="list-style-type: none"> <li>• Formulas 1,2</li> <li>• Definition 3, Theorem 4</li> <li>• Higher Derivatives</li> </ul>	3,5,7		29,49

Ch3: Differentiation Rules	3.1 The Derivative of polynomials and exponential function	<ul style="list-style-type: none"> <li>• Constant functions</li> <li>• Power functions</li> <li>• Definition of normal line p.176</li> <li>• New derivatives from old</li> <li>• Exponential functions</li> </ul>	1-6,8	23	3-35(odd)
	3.2 The product and quotient rules	<ul style="list-style-type: none"> <li>• The product rule</li> </ul> Quotient rule	1-5		3-33(odd)
	3.3 Derivatives of Trigonometric Functions	Derivative of Sine Function, Derivative of Cosine Function, Derivative of other Basic Trigonometric Function.	1,2(diff.only), 4-6	21, 40,46 42, 45 ,47, 48	1-7(odd), 39,49
	3.4 The Chain Rule and Parametric Equations	The Chain Rule.	1-9	33,53	1- 15(odd),44, 47,48
	3.5 Implicit Differentiation	Implicit Differentiation, Derivatives of Higher Order, Derivatives of Inverse Trigonometric Functions.	1,2(a,b)-5,	12,26	5- 11(odd),25, 35,37,49,55
Ch4: Applications of Differentiation	3.6 Derivatives of Logarithmic Functions	<ul style="list-style-type: none"> <li>• Derivatives of Logarithmic Functions</li> </ul>	1-8	19,52	3- 17(odd),31, 43-47
	4.1 Maximum and Minimum Values	<ul style="list-style-type: none"> <li>• Definition 1,2,6</li> <li>• Extreme Value Theorem, Critical Number.</li> </ul>	4,7,8 Read 2,3	4	5,29,47,53
	4.3 How derivatives affect the shape of a graph	<ul style="list-style-type: none"> <li>• Increasing/decreasing test</li> <li>• Monotonic Function and Concavity, First and second derivative Test</li> <li>• Test for Concavity.</li> <li>• Definition: inflection point</li> </ul>	1,2,6 Read 7	12 (read 1)	9,19

**Note:** see the workshop at [mnorwali.kau.edu.sa](http://mnorwali.kau.edu.sa)

**Marks distribution :-**First Exam (120 min; 30 marks); Second Exam (120 min; 30 marks); Final Exam (120 min; 40 marks);

#### Note

Appendices A&B are not included in the exams.

Exam1 from Appendix D, sec.1.1-end of sec.1.5. (to be arrange later)

Exam2 from sec.1.6-end of sec.2.8.+P192,193,198 (to be arrange later)

Final exam: All chapters