King Abdulaziz University
Department of Mathematics

Academic year 1442
2021

Math 110 "Students Syllabus"

Book: Calculus Metric Version Early Transcendentals by James Stewart 8th edition **(No Calculator)**

		Lectures			
Chapter Title	**Section**	**Theoretical (Definitions & Theorem)**	**Examples**	**Exercises**	**HW**
Appendixes	**Appendix A Numbers, Inequalities and Absolute Values**	• Intervals (Table). • Inequalities • Absolute value. • Properties (1-6).	1,2,3,4,6,7,8		
	Appendix B Coordinate Geometry and lines	• Slope of line. • Point-slope form of the equation of a line. • Slope-Intercept form of the equation of a line. • Parallel and perpendicular lines.	4,7,8		
	Appendix D Trigonometry	• Angles (convert formula). • The Trigonometric functions. • Trigonometric identities, 6-11, 15. • Graphs of the trigonometric functions (sin, cos, tan only) (domain, period of all) (range of sin, cos, tan only).	1,4	4,33	1-11(odd) 29-33(odd)

Ch1: Functions and Models	**1.1 Four ways to represent a function**	• **Definitions: Function, Domain and Range.** • **Vertical line test.** • **Piecewise defined functions.** • **Symmetry (odd & even) functions. **** • **Increasing and Decreasing Functions (open or closed intervals are correct)** • **Add (NOTE 1) in math 110 notes.**	**2,6,7,8,11 Read 1**	**9, 31, 33, 34, 38, 40, 49, 76.**	**7-10, 32-34, 41, 46, 73-78**
	1.2 Mathematical Models: A Catalog of essential functions	• **Essential functions: Polynomials, power, rational, algebraic, trigonometric, exponential and logarithmic ($\ln x$).** • **Add (NOTE 2) in math 110 notes.** • **Graphs of functions *.**	**6, examples of constant functions: $f(x) = ln7, g(x) = e^2, h(x) = sin1$**	**2**	**1**
	1.3 New functions from old functions	• **Transformation of functions.** **i)Vertical and horizontal shifts.** **ii) Vertical and horizontal reflecting.** • **Combination of functions (f±g, f.g, f/g, Composite Functions) and their domain.** • **Add Example :** **Remark:** **Don't simplify the functions (f±g, f.g, f/g) before calculating the domain.**	**1 (without $y=2\sqrt{x}$), 2, 3(b) add to example (3) Sketch the graph of (a) $y = cos\left(x - \frac{\pi}{2}\right)$ Then find the domain and range, 5-9+in example.7 find $(fog)(1), (fof)(16)$**	**1(a-f) Add to exercise (1) and solve it for $y = 2^x$ and $y = x^2$ 32**	**29-39(odd) ,41 ,47 *try to sketch $y = cosx - 3$ $y = 2 + cosx$ Then find the domain and range**
	1.4 Exponential Functions	• **Laws of Exponents.** • **The Number e.**	**1**	**2, 13, 19, 20**	**1,3,17**
	1.5 Inverse Functions and Logarithms	• **Definition1: (1-1) in P.56 or (If $f(x_1) = f(x_2)$ then $x_1 = x_2$)** • **Horizontal line test.** • **Definition 2: Inverse Functions.** • **How to find the inverse function.** • **Logarithmic functions.** • **Natural logarithm.** • **Graphs and growth of natural logarithm.** • **Inverse of Trigonometric Functions: $(sin^{-1}, cos^{-1}, tan^{-1}$ only).** **Identify the graphs of a function and it's inverse if they are given on the same axes+** **Add (NOTE 3) in math 110 notes.**	**1, 2, Add prove that the function $y=\sqrt[3]{\frac{x+2}{2}}$ is 1-1 "by def." 4, Replace f(x) in example(5) by $f(x)=\sqrt{x-1}$ 7-13 Read 3,6**	**22, 23, 37(b), 40, 48(a), 51(a,b), $+log_5(3x - 10) = 2$ 53(a), 57, 64, 68 (a) $arcsin(sin 7\pi/3)$ 68(b)**	**21-26(odd) 35-41(odd) 52**

Ch2: Limits and derivatives	**2.2 The Limits of a Functions**	• **Definition1-6.** • **One-sided limits.** • **Infinite limits: (vertical asymptote).** • **Figure 17.** • **Add (NOTE 4) in math 110 notes.**	**7-10**	**9, 12, 39, 44**	**4,7,8,11**
	2.3 Calculating Limits Using the Limits Laws **سننتقل إلى درس 3.3**	• **The Limits Laws 1-11** • **Theorem1, 2.** • **The squeezed theorem+ Figure 7.** • **limit of trigonometric function(by theorem+ use identities+simplify)*P.191 relation 2, P.192 relation 3.** • **Add (NOTE 7) in math 110 notes.**	**2(a)-9,11** **example (8): Let it (T or F) instead of (Show that)** **P. 195: 5,6**	**15, 23, 24, 29, 59** **p.197: 42, 45, 48, 49, 50**	**12, 19, 20,22,25, 27, 31, 32,35-37,** **p. 197: 39**
	2.5 Continuity	• **Definition1: Continuity at A number.** • **Definition2: Continuity from the right and from the left.+ Definition3** • **Theorem 4-9.** • **Add (NOTE 5) in math 110 notes.**	**2(a-c), 6, 8, 9 (Read 5, 7)**	**3, 45**	**17, 20, 21, 25, 38, 43**
	2.6Limits at infinity	• **Definition1-3.** • **Theorem 4-6.** • **Infinite limits at infinity.** • $\lim_{x\to\infty} ax^n$ **if n odd or even.** • **Add (NOTE 6) in math 110 notes.**	**1-11**	**36, 49**	**19, 30, 35, 37, 50**
	2.7 Derivatives and rates of charge	• **Tangents.** • **Definition 1, 2.** • **Derivatives.** • **Definition 4, 5.**	**1,4,5**		
	2.8 The Derivatives as a Function	• **Formulas 1, 2.** • **Other Notations.** • **Definition 3, Theorem 4.** • **Higher Derivatives.**	**3, 5, 7**		**29, 55**

Ch3: Differentiation Rules	3.1 The Derivative of polynomials and exponential function	• Constant functions. • Power functions. • Definition of normal line P.175. • Horizontal tangent. • New derivatives from old. • Derivative of the natural exponential function.	1-6, 8	23	3-31(odd), 37
	3.2 The product and quotient rules	• The product rule. • Quotient rule.	1-5		3-33(odd)
	3.3 Derivatives of Trigonometric Functions	• Formulas 4-6. • Derivative of Trigonometric Functions.	1,2(diff. only), 4-6	21, 42, 45, 48, 49, 50	1-7(odd), 39,51
	3.4 The Chain Rule and Parametric Equations	• The Chain Rule. • The power rule combined with the chain rule. • Formula 5.	1, add to example (2) find y'' , 3-9	23, 53	1-15(odd), 44, 47, 48
	3.5 Implicit Differentiation	• Derivatives of Inverse Trigonometric Functions.	1, 2(a,b), 3-5,	12, 25	5-11(odd), 35, 37, 49, 55
	3.6 Derivatives of Logarithmic Functions	• Formulas 1-4. • Logarithmic differentiation.	1-8	19, 52	3-15(odd), 21, 31, 43-47
Ch4: Applications of Differentiation	4.1 Maximum and Minimum Values	• Definition 1, 2 • Definition 6 (Critical Number). • The closed Interval Method.	8	3	5,29,47,53
	4.3 How derivatives affect the shape of a graph	• Increasing/decreasing test • The First derivative Test • Definition: (concavity) + Concavity test. • Definition: inflection point	1,2,6(بدون رسم)	1, 9	5,11

*** The graphs that students must Know:**

Y=$sin\,x$, y=$\cos x$, y=$tan\,x$
Y=x, y=|x|, y=$\sqrt{x}$,$\sqrt[3]{x}$,$\sqrt[4]{x}$,$\sqrt[5]{x}$,...
$Y=x^2$, (and similarly $y=x^4$, $y=x^6$, ...etc)
$Y=x^3$, (and similarly $y=x^5$, $y=x^7$, ...etc)
Y= $\frac{1}{x}$, (and similarly Y=$\frac{1}{x^3}$, Y=$\frac{1}{x^5}$ ...etc)
Y=$\frac{1}{x^2}$, (and similarly Y=$\frac{1}{x^4}$, Y=$\frac{1}{x^6}$ ...etc)
Exponential function, logarithmic function.

**** Trigonometric functions (odd & even):**

Even	Odd
$cos\,x$	$sin\,x$
$sec\,x$	$csc\,x$
	$tan\,x$
	$cot\,x$

Marks distribution:-

	First Exam	Second Exam	Final Exam	
Time ; marks	120 min; 30 marks	120 min; 30 marks	120 min; 40 marks	Total: 100