



Math 110 "Students Syllabus" / Term(2)

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	<ul style="list-style-type: none"> • Intervals (Table). • Inequalities • Absolute value. • Properties (1-6). 	1,2,3,4,6,7,8		
	Appendix B Coordinate Geometry and lines	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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

<p>1.1 Four ways to represent a function</p>	<ul style="list-style-type: none"> • Definitions: Function, Domain and Range. • Vertical line test. • Piecewise defined functions. • Symmetry (odd & even) functions. ** • Increasing and Decreasing Functions <u>(open or closed intervals are correct)</u> 	<p>2,6,7,8,11 Read 1</p>	<p>9, 31, 33, 34, 38, 40, 49, 76.</p>	<p>7-10, 32-34, 41, 46, 73-78</p>
<p>1.2 Mathematical Models: A Catalog of essential functions</p>	<ul style="list-style-type: none"> • Essential functions: Polynomials, power, rational, algebraic, trigonometric, exponential and logarithmic ($\ln x$). • Graphs of functions *. 	<p>6</p>	<p>2</p>	<p>1</p>
<p>1.3 New functions from old functions</p>	<ul style="list-style-type: none"> • Transformation of functions. <ul style="list-style-type: none"> i) Vertical and horizontal shifts. ii) Vertical and horizontal reflecting. • Combination of functions ($f \pm g$, $f \cdot g$, f/g, Composite Functions) and their domain. <p>Remark: Don't simplify the function f/g before calculating the domain.</p>	<p>1 (without $y=2\sqrt{x}$), 2, 3(b) add to example (3) Sketch the graph of (c) $y = \cos x$ (d) $y = \cos x + 3$ (e) $y = \cos(x - \frac{\pi}{2})$ Then find the domain and range, 6-9</p>	<p>1(a-f) Add to exercise (1) and solve it for $y = 2^x$ and $y = x^2$ 32</p>	<p>29-39(odd), 41, 47 *try to sketch $y = \cos x - 3$ $y = 2 + \cos x$ $y = \sin x$ $y = \sin x + 3$ Then find the domain and range</p>
<p>1.4 Exponential Functions</p>	<ul style="list-style-type: none"> • Laws of Exponents. • The Number e. 	<p>1</p>	<p>2, 13, 19, 20</p>	<p>1,3,17</p>
<p>1.5 Inverse Functions and Logarithms</p>	<ul style="list-style-type: none"> • Definition1: (1-1) in P.56 <u>or</u> (If $f(x_1) = f(x_2)$ then $x_1 = x_2$) • Horizontal line text. • 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). • Table 11 (def. only without domain and range). 	<p>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</p>	<p>22, 23, 37(b), 40, 48(a), 51(a,b), 53(a), 57, 64, 68 (a) $\arcsin(\sin \frac{7\pi}{3})$ 68(b)</p>	<p>21-26(odd) 35-41(odd) 52</p>

Ch2: Limits and derivatives

<p>2.2 The Limits of a Functions</p>	<ul style="list-style-type: none"> • Definition1-6. • One-sided limits. • Infinite limits: (vertical asymptote). • Figure 17. 	<p>1,7-10</p>	<p>9, 12, 39, 44</p>	<p>4,7,8,11</p>
<p>2.3 Calculating Limits Using the Limits Laws</p>	<ul style="list-style-type: none"> • The Limits Laws 1-11 • Theorem1, 2. • The squeezed theorem+ Figure 7. • limit of trigonometric function(by theorem)*P.191 relation 2, P.192 relation 3 +relations in 'notes in math110'. 	<p>2(a)-9,11 example (8): Let it (T or F) instead of (Show that) P. 195: 5,6</p>	<p>15, 23, 24, 29, 59 p.197: 42, 45, 48, 49, 50</p>	<p>12, 19, 20,22,25, 27, 31, 32,35-37, p. 197: 39</p>
<p>2.5 Continuity</p>	<ul style="list-style-type: none"> • Definition1: Continuity at A number. • Definition2: Continuity from the right and from the left. • Theorem 4-9. 	<p>2(a-c), 6, 8, 9 Read5, 7</p>	<p>3, 45</p>	<p>17, 20, 21, 25, 38, 43</p>
<p>2.6Limits at infinity</p>	<ul style="list-style-type: none"> • Definition1-3. • Theorem 4-6. • Infinite limits at infinity. • $\lim_{n \rightarrow \infty} ax^n$ if n odd or even. 	<p>1-11</p>	<p>36, 49</p>	<p>19, 30, 35, 37, 50</p>
<p>2.7 Derivatives and rates of change</p>	<ul style="list-style-type: none"> • Tangents. • Definition 1, 2. • Derivatives. • Definition 4, 5. 	<p>1,4,5</p>		
<p>2.8 The Derivatives as a Function</p>	<ul style="list-style-type: none"> • Formulas 1, 2. • Other Notations. • Definition 3, Theorem 4. • Higher Derivatives. 	<p>3, 5, 7</p>		<p>29, 55</p>

Ch3: Differentiation Rules	3.1 The Derivative of polynomials and exponential function	<ul style="list-style-type: none"> • Constant functions. • Power functions. • <u>Definition of normal line P.175.</u> • 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	<ul style="list-style-type: none"> • The product rule. • Quotient rule. 	1-5		3-33(odd)
	3.3 Derivatives of Trigonometric Functions	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Definition 1, 2 • Definition 6 (Critical Number). • The closed Interval Method. 	8	3
4.3 How derivatives affect the shape of a graph		<ul style="list-style-type: none"> • 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:**

$Y = \sin x, y = \cos x, y = \tan x$

$Y = x, y = |x|, y = \sqrt{x}, \sqrt[3]{x}, \sqrt[4]{x}, \sqrt[5]{x}, \dots$

$Y = x^2$, (and similarly $y = x^4, y = x^6, \dots$ etc)

$Y = x^3$, (and similarly $y = x^5, y = x^7, \dots$ etc)

$Y = \frac{1}{x}$, (and similarly $Y = \frac{1}{x^3}, Y = \frac{1}{x^5} \dots$ etc)

$Y = \frac{1}{x^2}$, (and similarly $Y = \frac{1}{x^4}, Y = \frac{1}{x^6} \dots$ 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; 33 marks	120 min; 33 marks	120 min; 44 marks	Total: 100

Note

- ✓ Appendices A&B are not included in the exams.
- ✓ See the **workshop** at hashoaib.kau.edu.sa