Exam III Study Guide

Exam III is based on Sections 3.11 and 4.1–4.7 of the textbook. It is a 105-minute exam available through your Pearson MyLab Mth link on WyoCourses. The exam will be available for a 72-hour period, Wed April 29 through Fri May 1, but you are advised to start earlier rather than later to avoid overloaded servers. In particular, morning hours are the best time to successfully maintain a connection for the duration of the exam. If you are cut off before submitting your exam, try again a little later. You may use your textbook and personal notes, as well as a calculator; but you must work on your own without help from human, computer or internet sources (other than the textbook itself).

The following skills are considered important preparation for the Exam.

Problem Type	**Examples in the Text**
Given a problem in which two functions' derivatives are related, find the rate of change of one function given the rate of change of the other.	§3.11: 5–39
Given a function $f(x)$, find: • Critical points and inflection points of its graph • The values of x where $f'(x) = 0$ • The interval(s) on which $f(x)$ is increasing • The interval(s) on which $f(x)$ is decreasing • The values of x where $f''(x) = 0$ • The interval(s) on which $f(x)$ is concave up • The interval(s) on which $f(x)$ is concave down	§4.1 11–50; §4.2: 17–38, 57–70
Given a constrained optimization problem, • Identify the objective function (i.e. the function to be maximized or minimized) and the constraint • Use the constraint to eliminate one of the variables • Examine critical points and endpoints to maximize or minimize the objective function.	§4.4: 5–68 (especially problems involving geometric figures such as rectangles, circles, cylinders, and spheres)
Sketch the graph of a function, given properties such as its values at specific points, intervals over which its values are positive and negative, intervals over which which its derivative is positive and negative, and intervals over which its second derivative is positive and negative.	§4.3: 7–8, 57–60
For a specified function $f(x)$ and a given interval $[a, b]$, • Calculate the average slope of $f(x)$ over $[a, b]$ • Determine whether the Mean Value Theorem applies • If so, find a value of c in the interval $[a, b]$ for which $f'(c)$ equals the average slope.	§4.6: 17–24.
For limits of the form $\lim_{x\to a} f(x)/g(x)$, • Determine whether they have the indeterminate form $0/0$ or ∞/∞ • Use l'Hôpital's rule to calculate the limits, in cases where the rule applies.	§4.7: 13–44

You may wish to refer to these formulas during the exam (although due to the online format of the exam, these formulas will not appear there).

$f(u)$	$f'(u)$
$\tan u$	$\sec^2 u$
$\cot u$	$-\csc^2 u$
$\sec u$	$\sec u \tan u$
$\csc u$	$-\csc u \cot u$
$\ln g(u)$	$g'(u)/g(u)$
$\log_b u$	$1/(u \ln b)$
$\sin^{-1} u$	$1/\sqrt{1-u^2}$
$\tan^{-1} u$	$1/(1+u^2)$
$\sec^{-1} u$	$1/(\lvert u\rvert\sqrt{u^2-1})$
$\cos^{-1} u$	$-1/\sqrt{1-u^2}$
$\cot^{-1} u$	$-1/(1+u^2)$
$\csc^{-1} u$	$-1/(\lvert u\rvert\sqrt{u^2-1})$

Chain rule: $(f \circ g)'(x) = f'(g(x))g'(x)$