Math 141 Fall 2016 Review Items for Exam 2

The second midterm is Monday 10/24/2016. It will cover all of Chapter 3 except sections 3.7 and 3.11. Also material in Section 1.5 is relevant.

Here are some differentiation formulas to know. In the formulas below you should assume $u = u(x)$ is a function of x.

$F(x)$	$F'(x)$
c	0
u^n	$nu^{n-1}\frac{du}{dx}$
$\sin(u)$	$\cos(u)\frac{du}{dx}$
$\cos(u)$	$-\sin(u)\frac{du}{dx}$
$\tan(u)$	$\sec^2(u)\frac{du}{dx}$
$\sec(u)$	$\sec(u)\tan(u)\frac{du}{dx}$
$\csc(u)$	$-\csc(u)\cot(u)\frac{du}{dx}$
$\cot(u)$	$-\csc^2(u)\frac{du}{dx}$
a^u	$a^u \ln(a)\frac{du}{dx}$
$\log_a(u)$	$\frac{1}{u \ln a}\frac{du}{dx}$
$\sin^{-1}(u)$	$\frac{1}{\sqrt{1-u^2}}\frac{du}{dx}$
$\cos^{-1}(u)$	$\frac{-1}{\sqrt{1-u^2}}\frac{du}{dx}$
$\tan^{-1}(u)$	$\frac{1}{1+u^2}\frac{du}{dx}$

Product Rule: $(f(x)g(x))' = f'(x)g(x) + f(x)g'(x)$

Quotient Rule: $(\frac{f(x)}{g(x)})' = \frac{g(x)f'(x)-f(x)g'(x)}{g(x)^2}$.

Chain Rule: $(f(g(x))' = f'(g(x))g'(x)$.

Other skills to have:

(1) Be familiar with rules for logs and exponentials. Know the domains of these functions and how to sketch basic examples.

(2) Given an equation $F(x, y) = 0$ find $y' = dy/dx$ by implicit differentiation. Also use this to find tangent lines, horizontal tangent lines. Find y'' by implicit differentiation.

(3) Given two data points for a quantity with exponential growth or decay, find an equation $y = y(0)e^{kt}$. Be able to work problems with half-lives.

(4) Solve related rate problems.

(5) Given a function $f(x)$, compute its linear approximation $L(x)$ as on page 252. Use the linear approximation to estimate the values of the function, for example Example 1 on page 252 or $23 - 28$ in Section 3.10.

(6) Given $y = f(x)$ calculate the differential dy.