Must Know Material for FINAL - M151 - Calculus II - Spring 2021

The following is a comprehensive list of the topics that will (and will not) be included in the final:

- Sec. 3.11 Hyperbolic Functions
- Sec. 6.1: Areas Between Curves
- Sec. 6.2: Volumes (by slices, disks and washers)
- Sec. 6.3: Volumes by Cylindrical Shells
- Secs. 6.4 and 6.5 will **NOT** be included in Final
- Sec. 7.1: Integration by Parts
- Sec. 7.2: Trigonometric Integrals
- Sec. 7.3: Trigonometric Substitution
- Sec. 7.4: Partial Fractions
- Sec. 7.8: Improper Integrals
- Sec. 8.1: Arc Length
- Sec. 8.2: Surface of Revolution
- Sec. 9.3: Separable Equations (**NO** orthogonal curves and **NO** mixing problems)
- Sec. 9.5: Linear Differential Equations
- Sec. 11.2: Series (only geometric series and its applications)
- Sec. 11.6: Ratio Test: interval and radius of convergence (**NO** absolute convergence and **NO** Root test)
- Sec. 11.9: Representations of Functions as Power Series
- Sec. 11.10: Taylor and Maclaurin Series (**NO** Taylor inequality and **NO** remainder)
- Sec. 11.11: Applications of Taylor Series (**only** Approximating Functions by Polynomials, **NO** Remainder)
- Sec. 10.1: Curves Defined by Parametric Equations
- Sec. 10.2: Calculus with parametric Equations
- Sec. 10.3: Polar Coordinates (inc. slopes that was not included in MiniTest#4)
- Sec. 10.4: Areas and Lengths in Polar Coordinates (this material was not included in MiniTest#4)
- Secs. 10.5 and 10.6 will **NOT** be included in Final

You must also be very confident with ALL the material covered in previous Mini-tests. You can have a look at the following "Must-know material for previous Mini-Tests":

- `http://carretero.sdsu.edu/teaching/M-151/MTs/MiniTest1_must_know.pdf`
- `http://carretero.sdsu.edu/teaching/M-151/MTs/MiniTest2_must_know.pdf`
- `http://carretero.sdsu.edu/teaching/M-151/MTs/MiniTest3_must_know.pdf`
- `http://carretero.sdsu.edu/teaching/M-151/MTs/MiniTest4_must_know.pdf`

In addition to studying ALL Calc-I and Calc-II material above, you must be very confident with the following basic and fundamental topics/formulas/techniques/tricks/hints/etc.:

SEQUENCES and SERIES:

- Geometric series.
- Applications of geometric series: problems involving: investments, savings, interests, loans, drug delivery, fractals, bounding balls, etc... (check textbook/HWs/labs/worksheets for all different types of problems).
- Computing interval and radius of convergence (using ratio test).
- Taylor and McLaurin series (no Taylor inequality and no remainder).
- Remember that $n! = 1 \times 2 \times \cdots \times n$, that $(n+1)! = (n+1) \times n!$, and that $0! = 1$ and $1! = 1$.

In addition to ALL the material that was included in the MiniTests, you must be VERY confident with the following basic and fundamental topics/techniques/etc. that were not covered in the MiniTests:

- Polar coordinates: $r = f(\theta)$
  - Tangent's slope in polar: use tangent for parametric (as above) with $x = f(\theta)\cos(\theta)$ and $y = f(\theta)\sin(\theta)$:
    * Horizontal $\Rightarrow$ m=0/const (i.e. numerator of $m(\theta) = 0$ **and** denominator$\neq 0$).
    * Vertical $\Rightarrow$ m=const/0 (i.e. denominator of $m(\theta) = 0$ **and** numerator$\neq 0$).
    * 0/0 or $\infty/\infty \Rightarrow$ L'Hôpital (i.e. **both** numerator and denominator are zero or both are $\pm\infty$).
    * Point-slope formula: $(y - y_0) = m(x - x_0)$.
  - Area: $A = \int_{\theta_1}^{\theta_2} \frac{1}{2}[f(\theta)]^2 \, d\theta$.
  - Arclength: $L = \int_{\theta_1}^{\theta_2} \sqrt{[f(\theta)]^2 + [f'(\theta)]^2} \, d\theta$.