640:152 Calculus II Review Exercises, Spring 2012

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This course covers selected sections from Chapters 6-12 in your textbook. Please note that the exercises listed are intended to assist you in reviewing the main topics of the course outlined below, but it is not to be used as a template for your final examination. You will likely have problems that do not resemble these review problems.

1. Things you should know from precalculus & Calculus 151
   - values of $\sin x$, $\cos x$ for $0, \frac{\pi}{6}, \frac{\pi}{4}, \pi, \ldots$ and trig identities
   - definition of hyperbolic trig functions ($\sinh x, \cosh x, \tanh x, \ldots$) and basic identities
   - graphs of common functions ($\cos x, e^x, \log, \tanh x, \ldots$), shifting/scaling (e.g., $5+15\arcsin(\pi x+7)$)
   - sequences (definition, boundedness, Geometric sequence $a_n = cr^n$, etc.)
   - limits (limit laws, L'Hopital's Rule, squeeze theorem), asymptotes (vertical and horizontal)
   - equation of the tangent line of a function $f(x)$ at $x = a$
   - definition of the Riemann Integral $\displaystyle\int_a^b f(x)dx$
2. Definitions
   - $\lim_{x\to a} f(x)$ exists/does not exist (also $\lim_{x\to a^{\pm}} f(x)$ exists/does not exist), $\lim_{x\to\pm\infty} f(x)$ converges/diverges
   - improper integral converges/diverges, e.g., $\displaystyle\int_a^\infty f(x)dx$, $\displaystyle\int_a^b f(x)dx$ when $f(x)$ has a discontinuity at a, b or an interiour point c in (a, b).
   - average value of a function $f(x)$ over an interval $[a, b]$
   - infinite series $\displaystyle\sum_{n=1}^{\infty} a_n$ converges, converges absolutely, converges conditionally, diverges
   - partial sums, geometric series
   - power series of a function, radius of convergence
   - Taylor/Maclaurin series, Taylor/Maclaurin polynomial
   - parametric curve, polar curve
   - first-order, linear, separable differential equation
3. Important Concepts
   - areas between curves (of the form $y = f(x)$, polar)
   - volume of a solid body (cross sections, solids of rotation: disk, annulus or cylindrical shells methods)
   - Midpoint, Trapezoidal, Simpson's Rules
   - Maclaurin series for $\ln(1-x), \sin x, \cos x, e^x, \frac{1}{1-x}$ and radius of convergence of each
   - arclength & surface area (of the form $y = f(x)$, parametric, polar)
   - geometric series, p-series
   - graphing polar curves and converting between cartesian and polar coordinates
   - curves/surfaces in cylindrical and spherical coordinates
   - separation of variables

4. Methods/Techniques to Practice

   - integration techniques (Integration by Parts, Trigonometric Integrals, Trig Substitution, Hyperbolic Integrals, Partial Fractions and combinations therein)
   - tests for convergence/divergence of infinite series (Test for Divergence, Leibniz or Alternating Series Test, Comparison Test, Limit Comparison Test, Integral Test, Ratio Test, Root Test,
   - finding Maclaurin series for a given function (by hand or from known Maclaurin series)
   - power series solutions to differential equations

5. Suggested Chapter Review Exercises

   - Chapter 6 (pp. 397–399): #4, 10, 15, 17, 26, 34, 35, 45, 46
   - Chapter 7 (pp. 463–466): #20, 23, 28, 31, 40, 43, 57, 64, 80, 82, 92, 102
   - Chapter 8 (pp. 499–501): #2, 11, 23
   - Chapter 9 (pp. 534–536): #1, 2, 9, 10
   - Chapter 10 (pp. 603–606): #8, 17, 19, 23, 31, 56, 61, 62, 78, 92, 98, 99, 101, 112, 118
   - Chapter 11 (pp. 655–656): #2, 3, 7, 12, 18, 22, 24, 30, 33, 34, 37, 38
   - Chapter 12 (pp. 720–722): #62, 64, 68