

Will's Guide To Life, Volume 3

Math 231

Fall 2008

Section 8.6

Power Series. The definition of a power series, and the idea of a Radius of Convergence and Interval of Convergence. Finding the Interval of Convergence by setting up a Ratio Test and setting it less than 1, then checking our endpoints to see if the series will converge there. Integrating and differentiating power series term-by-term when we are in the interval of convergence.

Section 8.7

Taylor Series. The general form for the k^{th} term of a Taylor Series. Taylor Polynomials as partial sums of the Taylor Series. Taylor's Theorem, with all the hypotheses. What is z in the remainder term? Using Taylor's Theorem to prove certain Taylor Series converge. You need to know the Taylor Series for $\sin x$, $\cos x$, e^x , $\ln|1 - x|$ and $\arctan x$. Know how to calculate the interval of convergence for Taylor Series.

Section 8.8

Applications of Taylor Series. Using Taylor Polynomials to approximate functions at some point. Using known Taylor Series to create power series expansions for other functions. Making sure to check the interval of convergence! Using series expansions to calculate limits instead of using L'Hôpital. Using Taylor Polynomials to approximate definite integrals. Representing integrals with Power Series. The Binomial Series.

Section 8.9

Fourier Series. The definition of the Fourier Series. The formulas for the Fourier Coefficients for a 2π periodic function on $[-\pi, \pi]$. Tricks you can play with even and odd functions. Extensions of the Fourier Series to L -periodic functions.

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Section 9.1

Plane Curves and Parametric Equations. Orientation of a parametric curve, one way it has more information than the graph $y = f(x)$. Using parametric equations to make graphs in the $x - y$ plane that are not functions. Defining circles and ellipses by parametric equations. Eliminating the parameter in a parametric equation to get $y = f(x)$. (Being careful here!) The difference between graphs intersecting and parametric curves intersecting.

Section 9.2

Calculus and Parametric Curves. How to find the slope of the tangent line, $\frac{dy}{dx}$ for a parametric curve. When to use L'Hôpital, when you can have a vertical tangent line. How to calculate the second derivative $\frac{d^2y}{dx^2}$ and how NOT to. The speed of a parametric curve. Area enclosed by a parametric curve, it's different between traversing a curve clockwise or counterclockwise!

Section 9.3

Arc Length and Surface Area in Parametric Equations. The formula for the arc length of a parametric curve, how it relates to the arc length of a curve $y = f(x)$. The formula for the surface area of a curve rotated around a line. How this formula relates to the arc length.

Section 9.4

Polar Coordinates. How using a radius r and an angle θ give you the same information as (x, y) does. Converting from Cartesian (x, y) coordinates to Polar (r, θ) . Graphing simple polar functions such as circles, lines through the origin, limaçons, roses and cardioids.