Course Review

Chapter 8 - Polar Coordinates, Vectors, Parametrics

8-1 Polar Coordinates

Polar coordinates: (r,θ) *When $r < 0$: point is on the opposite side of the pole (origin).*
Multiple polar coordinates: +/- "r" and +/- " θ " result in multiple representations of the same coordinates.
Convert from polar to rectangular: $x = r\cos(\theta)$; $y = r\sin(\theta)$
Convert from rectangular to polar: $r = \sqrt{(x^2 + y^2)}$; $\theta = \tan^{-1}(y/x)$

8-2 Polar Equations and Graphs

Convert from rectangular to polar	Convert from polar to rectangular
replace x with $r\cos(\theta)$	try to isolate $r\cos(\theta)$ and replace with x
replace y with $r\sin(\theta)$	try to isolate $r\sin(\theta)$ and replace with y
replace $x^2 + y^2$ with r^2	replace r with $\sqrt{(x^2 + y^2)}$
solve for r is possible/practical	replace θ with $\tan^{-1}(y/x)$

Methods of graphing

- convert to rectangular coordinates
- make a table and use symmetry
- use r-value analysis *(graph on the Cartesian coordinate plane as reference, using r in place of y)*
- use a graphing calculator *(remember to set* MODE *to* POL*, and check for radians vs degrees)*

8-4 Vectors $(A = \hat{i} + \hat{j} + \hat{k})$

Addition (resultant): add corresponding components
Absolute Value (magnitude): three-dimensional application of the Pythagorean theorem
Scalar Multiplication: multiply each component by the scalar
Subtraction: multiply second vector by -1, and then add

8-5 The Dot Product (Scalar Product)

Dot product: $u\cdot v\cdot w = a_1a_2a_3 + b_1b_2b_3 + c_1c_2c_3$
Angle between vectors: $A \cdot B = |A|\cdot|B| \cdot \cos(\theta)$
Parallel vectors: angle between the vectors = 0
Orthogonal (Perpendicular vectors): dot product = 0

8-8 Parametrics

Parametric equations: $x = f(t)$; $y = f(t)$; t is the independent variable
Domain and Range restrictions: 1) check t, 2) domain restrictions from x, 3) range restrictions from y
Graphing with table method: $[\, x(t), y(t) \,]$
Graphing with calculator: Set MODE to PAR.
Parametrics to rectangular: Use substitution for x and y; Use Pythagorean Identities for trig functions