Last Unit! Make notecards and memorize these:

General comment: Most of these integrals would be pretty intense to do by hand. If in a calculator active portion, **fnInt** is the operative term!

Polar Graphing:

Front	Back
In polar graphing, $x =$	$r\cos\theta$
In polar graphing, $y =$	$r\sin\theta$
$\frac{dy}{dx}$	$\frac{dy}{dx} = \frac{dy}{d\theta} \Big/ \frac{dx}{d\theta}$
In polar graphing, slope (dy/dx) at point (r,θ)	$\dfrac{\frac{dr}{d\theta}\sin(\theta) + r\cos(\theta)}{\frac{dr}{d\theta}\cos(\theta) - r\sin(\theta)}$.

Area on polar graph between $\theta = \alpha$ (*alpha*) and $\theta = \beta$ (*beta*)	$\int_{\alpha}^{\beta} \frac{1}{2}[r(\theta)]^2 \, d\theta$ Note: if asked for area between two curves, create two integrals and subtract.
θ in terms of x and y	$\arctan(y/x)$
r in terms of x and y	$\sqrt{x^2 + y^2}$

Parametric Equations

Front	Back
Slope ($\frac{dy}{dx}$)	$\frac{dy}{dx} = \frac{dy}{dt} \Big/ \frac{dx}{dt}$
Second derivative (concavity)	$\frac{d^2y}{dx^2} = \frac{d}{dt}(\frac{dy}{dx}) \Big/ \frac{dx}{dt}$
Arc length (s)	$= \int_a^b \sqrt{(dx/dt)^2 + (dy/dt)^2}\, dt$

Vectors and Vector Valued Functions

Front	Back
$\vec{r}(t)$ (position vector)	$< x(t), y(t) >$
$\vec{r}\,'(t)$ (velocity vector)	$< x'(t), y'(t) >$
$\vec{r}\,''(t)$ (acceleration vector)	$< x''(t), y''(t) >$
Distance Traveled (arc length)	$\int_a^b \sqrt{x'(t)^2 + y'(t)^2}\,dt$
Speed (magnitude of velocity)	$\lVert v \rVert = \sqrt{x'(t)^2 + y'(t)^2}$