Vector, Polar, and Parametric Functions

x(t) and y(t) are parametric functions

$$\frac{dy}{dx} =$$



ax

Vector, Polar, and Parametric Functions

Velocity vector if position vector is  $\langle x(t), y(t) \rangle$ 



Vector, Polar, and Parametric Functions

Speed if position vector is  $\langle x(t), y(t) \rangle$ 



Vector, Polar, and Parametric Functions

Given an initial position y(c)and a vertical velocity y'(t), y(d) =



Vector, Polar, and Parametric Functions

Arc Length of a curve f on [a, b] (rectangular)



x(t) and y(t) are parametric functions

$$\frac{d^2y}{dx^2} =$$



Vector, Polar, and Parametric Functions

Acceleration vector if position vector is  $\langle x(t), y(t) \rangle$ 



Vector, Polar, and Parametric Functions

Given an initial position x(a) and a horizontal velocity x'(t),

$$x(b) =$$



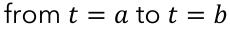
Vector, Polar, and Parametric Functions

Total distance traveled from t = a to t = b(parametric)



Vector, Polar, and Parametric Functions

Arc Length of a parametric curve  $\begin{cases} x(t) \\ y(t) \end{cases}$ 





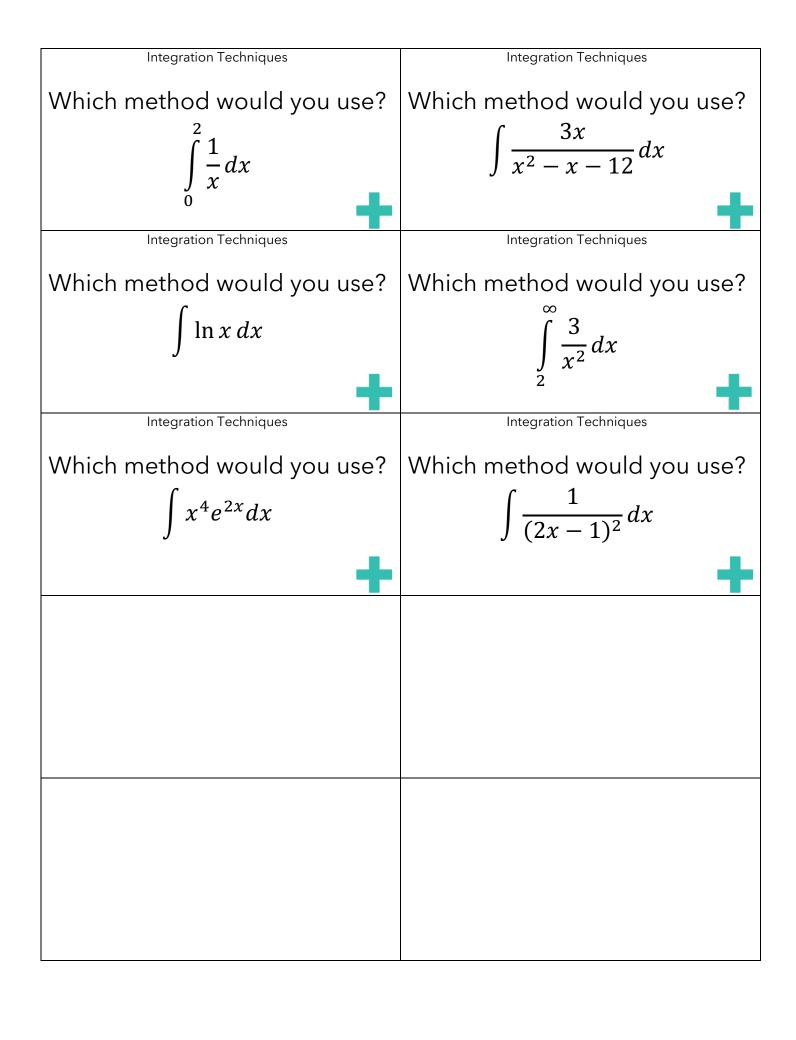
$\frac{\frac{d}{dx}\left(\frac{dy}{dx}\right)}{\frac{dx}{dt}}$	$\frac{\frac{dy}{dt}}{\frac{dx}{dt}}$
$a(t) = \langle x''(t), y''(t) \rangle$	$v(t) = \langle x'(t), y'(t) \rangle$
$x(b) = x(a) + \int_{a}^{b} x'(t)dt$	$\sqrt{(x'(t))^2 + (y'(t))^2}$
$\int_{a}^{b} \sqrt{(x'(t))^2 + (y'(t))^2} dt$	$y(d) = y(c) + \int_{c}^{d} y'(t)dt$
$\int_{a}^{b} \sqrt{(x'(t))^2 + (y'(t))^2} dt$	$\int_{a}^{b} \sqrt{1 + (f'(x))^2} dx$

Vector, Polar, and Parametric Functions	Vector, Polar, and Parametric Functions
vector, rolar, and rarametric runctions	vector, Folar, and Farametric Functions
Slope of tangent line	Polar Area
to a polar function $r( heta)$	(one function)
	(One farietien)
Vertex Balanca d Baranatais Functions	La Carina
Vector, Polar, and Parametric Functions	Infinite Series
Polar Area	Sum of a
(two functions)	Geometric Series
(21.2.131.3)	
Infinite Series	Infinite Series
minute Series	minute Series
Converge or diverge?	Converge or diverge?
∞ ,	∞ ,
$\sum 1$	$\sum_{i=1}^{n}$
$\angle \frac{\overline{n}}{n}$	$\angle \frac{\overline{n^p}}{n}$
$\overline{n=1}$	$\overline{n=1}$
Infinite Series	Infinite Series
minute Series	minute series
Converge or diverge?	Nul T T . C
8	Nth Term Test for
$\sum ar^n$	$\sum_{n=1}^{\infty} a_n$
$\sum ai$	
$\overline{n}$ =1	
Infinite Series	Infinite Series
Limit Comparison Test	Datio Toot for
for $\sum_{n=1}^{\infty} a_n$	Ratio Test for
	$\sum_{n=1}^{\infty} a_n$
(compare to $\sum_{n=1}^{\infty} b_n$ )	
•	•

$A = \frac{1}{2} \int_{\theta_1}^{\theta_2} (r(\theta))^2 d\theta$	$\frac{dy}{dx} = \frac{dy}{dx} / \frac{d\theta}{d\theta}$ (Use $x = r \cos \theta$ and $y = r \sin \theta$ to convert first)
$S = \frac{1}{1 - r}$	$A = \frac{1}{2} \int_{\theta_1}^{\theta_2} (r_{outer}(\theta))^2 - (r_{inner}(\theta))^2 d\theta$
Converges if $p > 1$ Diverges if $p \le 1$ P-series	Diverges Harmonic series
If $\lim_{n\to\infty}a_n\neq 0$ , the series diverges	Converges if $ r  < 1$ Geometric series
If $\lim_{n\to\infty}\frac{a_{n+1}}{a_n}<1$ , the series converges	If $\lim_{n\to\infty} \frac{a_n}{b_n}$ is a finite, positive value, both series converge or both diverge

Infinite Series	Infinite Series
milline Jenes	minite Series
Alternating Series Test	Absolute
for $\sum_{n=1}^{\infty} a_n$	Convergence
	9
+	+
Infinite Series	Infinite Series
	Nth term
Conditional	
Convergence	of a Taylor Polynomial
Convergence	centered at $x = a$
+	-
Infinite Series	Infinite Series
Power Series	Power Series
for $\sin x$	for $\cos x$
Infinite Series	Interpreting Techniques
infinite Series	Integration Techniques
Dower Corios	Integration by Parts
Power Series	Integration by Parts
for $e^x$	$\int udv =$
_	J aar =
<b>+</b>	•
Integration Techniques	Integration Techniques
	Which method would you use?
Improper Integrals	$\int x \sin x  dx$
	J x SIII x ux
+	+
•	•

Both $\sum_{n=1}^{\infty}  a_n $ and $\sum_{n=1}^{\infty} a_n$ converge	If the series is alternating and $\lim_{n \to \infty} a_n = 0$ , the series converges
$\frac{f^n(a)}{n!}(x-a)^n$	Either $\sum_{n=1}^{\infty}  a_n $ or $\sum_{n=1}^{\infty} a_n$ converges
$1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots + \frac{(-1)^n x^{2n}}{(2n)!}$	$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots + \frac{(-1)^n x^{2n+1}}{(2n+1)!}$
$uv - \int v du$	$1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots + \frac{x^n}{n!}$
Integration by Parts	$\int_{a}^{\infty} f(x)dx = \lim_{b \to \infty} \int_{a}^{b} f(x)dx$



Partial Fractions	Improper Integral
Improper Integral	Integration by Parts
U-Substitution	Integration by Parts