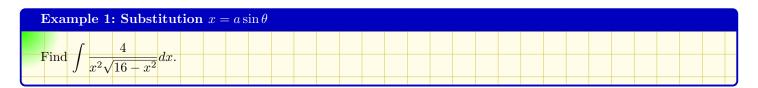
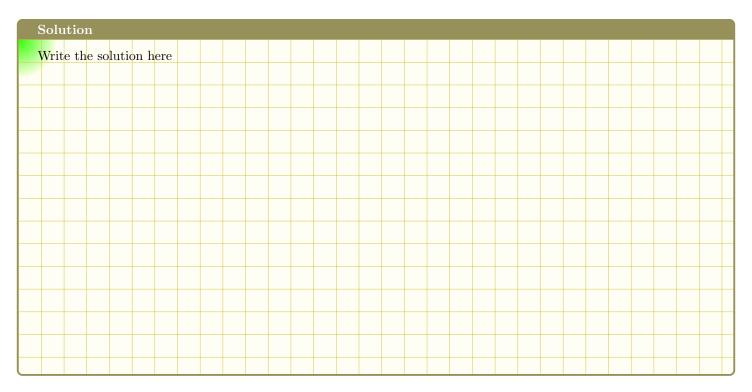
Trigonometric Substitution

Trigonometric Substitution

- For integrals that involve an expression of the form $\sqrt{a^2 x^2}$, try the substitution $x = a \sin \theta$, $-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$ then $dx = a \cos(\theta) d\theta$ and $\sqrt{a^2 x^2} = a \cos(\theta)$.
- For integrals that involve an expression of the form $\sqrt{a^2 + x^2}$, try the substitution $x = a \tan \theta$, $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$ then $dx = a \sec^2(\theta) d\theta$ and $\sqrt{a^2 + x^2} = a \sec(\theta)$.
- For integrals that involve an expression of the form $\sqrt{x^2 a^2}$, try the substitution $x = a \sec \theta$, $0 \le \theta < \frac{\pi}{2}$ or $\pi \le \theta < \frac{3\pi}{2}$ then $dx = a \sec(\theta) \tan(\theta) d\theta$ and $\sqrt{x^2 a^2} = a \tan(\theta)$.





Example 2:	Substitu	tion x	$a = a \tan b$	9										
	_c 3													
Find $\int \frac{1}{4\sqrt{4}}$	$\frac{1}{1+x^2}dx.$													

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Example 3: Substitution $x =$	$a \sec \theta$ with a definite integral	
$\int_{-\infty}^{8} \sqrt{x^2 - 16}$		
Find $\int_4 \frac{\sqrt{x}}{x^2} dx$.		

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$\mathbf{E}\mathbf{x}$	ample	4: Com	pleti	ing	\mathbf{the}	squ	are	and	l tr	ig s	sub									
T .	, (x	,																	
Fin	$\int \frac{1}{\sqrt{2}}$	$\sqrt{x^2 - 6x} +$	$-\frac{dx}{5}$	с.																

,	Solu	itio	n															
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Exa	mpl	e 5:	App	licat	ion	- Fo	\mathbf{rm}	ula	for	are	ea o	f an	ell	ipse	;									
Find	l the	are	ı encl	osed	bv tł	ne el	linse	$\frac{x^2}{2}$	+ 3	2	1 (h	are i	nosit	ive	con	stan	ts						
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Solu	itio	n															
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