







Ex) Find all values of x where Vertical tangents exist for ;

$$f(x) = (4 - x^2)^{1/3}$$

## Misc. Line Questions

Ex 1) Find all the points on the curve  $y = \frac{x+1}{x-1}$  where the

tangent line is parallel to the line  $y = -\frac{1}{2}x + 5$ .





## Implicit Differentiation

- used when we cannot explicitly solve for y!



Ex) x<sup>2</sup> + y<sup>2</sup> = 25



$$Ex) y^{3} + 3y^{2} - x + 4 = 0$$
  

$$Ex) xy^{5} = 4$$
  

$$Ex) xy + 4y^{2} - 3x = 0$$

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$$Ex) \quad x^{2}y^{3} + y^{2} - 6x^{2} = 4$$
$$Ex) \quad x^{2} = \frac{x - y}{x + y}$$

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Implicit Diff. with Trig Functions  

$$Ex) \quad x = \tan y$$

$$Ex) \quad x + \sin y = xy$$

$$Ex) \quad x^2y + \sin^2 y = \sec y$$

## Imp. Diff. w/ Tangent-Normal Lines

Ex) Find the tangent and normal lines to the curve  $x^2 + y^3 = -7$ , at x = 1.

Ex) Find the tangent and normal lines to the curve xy - x + y = 2, at x = 0.







Jeff Staruch Tuesday, April 22, 2014 8:33:12 AM ET 34:15:9e:33:44:34



















Tues	X	3	3.5	4	4.5	5	5.5	6
	I(X)	10	8	/	4	2	10	
	a) Find the	average ra	te of change	e of <i>f</i> from x	= 4  to  x = 6.			
	b) Estimate	the instant	aneous rate	e of change	of $f$ at $x = 4$ .			
	c) Find an	orovimately	an equatio	n of the tar	event at $x = A$			
	c) Fillu, apj	JIOXIMALEIY	, an equatio		igent at x – 4	-		
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	d) Use the	tangent line	e in (c) to es	timate f(4.5	).			

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