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Learning outcomes

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After completing this section, you will inshaAllah be able to

1. find derivatives of functions defined implicitly

2. find derivatives of expressions involving inverse trigonometric functions

How to perform implicit differentiation?

Recall:

What are implicitly defined functions?

- See class explanation

- We learn implicit differentiation with the help of examples.

See examples 1, 2, 3, 4, 5, 6, 7, 8 done in class

See example 8 to understand meaning of orthogonal curves

Differentiation formulas for inverse trigonometric functions

- $$\frac{d}{dx}(\sin^{-1}u) = \frac{1}{\sqrt{1-u^2}} \cdot \frac{du}{dx}$$

- $$\frac{d}{dx}(\cos^{-1}u) = -\frac{1}{\sqrt{1-u^2}} \cdot \frac{du}{dx}$$

- $$\frac{d}{dx}(\tan^{-1}u) = \frac{1}{1+u^2} \cdot \frac{du}{dx}$$

- $$\frac{d}{dx}(\cot^{-1}u) = -\frac{1}{1+u^2} \cdot \frac{du}{dx}$$

- $$\frac{d}{dx}(\sec^{-1}u) = \frac{1}{u\sqrt{u^2-1}} \cdot \frac{du}{dx}$$

- $$\frac{d}{dx}(\csc^{-1}u) = -\frac{1}{u\sqrt{u^2-1}} \cdot \frac{du}{dx}$$

See examples 9, 10, 11 done in class

End of 3.6