Week 4 Wednesday

January 30, 2019 7:37 AM

Test tomorrow
Quiz Thes 3.5

3.5 Cont'd

Ex: Find the function if the following transformations are applied (in order) to $y=\sqrt{x}$

1. Reflect in y-axis
2. Shift right 3 units

$y=\sqrt{x}$

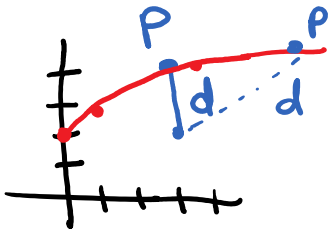
$y=\sqrt{-x}$

$y=\sqrt{-(x-3)}$ or $y=\sqrt{-x+3}$ or $y=\sqrt{3-x}$

3.6 Building Functions

Ex: Let $P=(x,y)$ be a point on the graph of $y=\sqrt{x}+2$.

a) Find the distance from P to $(3,2)$ as a function of x



$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$(x_1, y_1) = (x, y)$

$(x_2, y_2) = (3, 2)$

$$= \sqrt{(3-x)^2 + (2-y)^2}$$

$y = \sqrt{x} + 2$

$$= \sqrt{(3-x)^2 + (2-\sqrt{x}-2)^2}$$

$$= \sqrt{9 - 6x + x^2 + (-\sqrt{x})^2}$$

$$= \sqrt{9 - 6x + x^2 + x}$$

$$= \sqrt{9 - 5x + x^2}$$

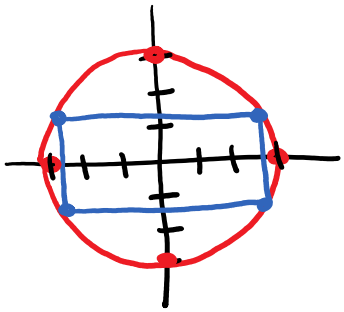
b) Find the distance when $x = 4$

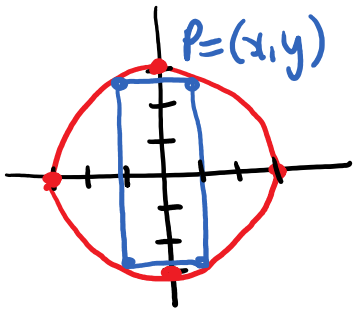
$$d = \sqrt{9 - 20 + 16}$$

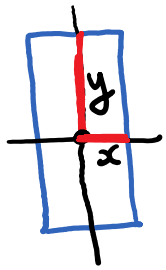
$$d = \sqrt{5}$$

Ex: A rectangle is inscribed in the circle of radius 3 centred at the origin. Let $P = (x, y)$ be the upper right corner of the rectangle. Find the rectangle's

area as a function of x.







Area = base · height

$= 2x \cdot 2y$

$= 4xy$

Point P lies on the circle

$(x-h)^2 + (y-k)^2 = r^2$

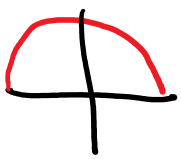
Centre $= (0,0)$ $\quad r = 3$

$x^2 + y^2 = 9$

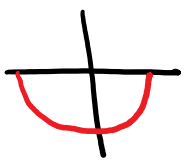
Solve for y:

$y^2 = 9 - x^2$

$y = \pm\sqrt{9-x^2}$



$y = \sqrt{9-x^2}$



$y = -\sqrt{9-x^2}$

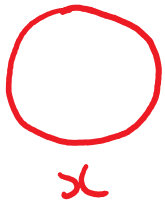
$$\text{Area} = 4xy$$

$$= 4x\sqrt{9-x^2}$$

Goals

1. Practice geometry formulas
2. Get comfortable with answers in function form

Ex: A wire of length x is bent into a circle. Express the circle's area as a function of x.



1) Find radius

$C = 2\pi r$

$x = 2\pi r$

$\frac{x}{2\pi} = r$

$r = \frac{x}{2\pi}$

2) Find area

$A = \pi r^2$

$A = \pi \left(\frac{x}{2\pi}\right)^2$

$$A = \pi \left(\frac{x^2}{4\pi^2} \right)$$

$$A = \frac{x^2}{4\pi}$$