

3.6 Max, Min

① Express the distance between (1,0) and the function $y = \sqrt{x}$

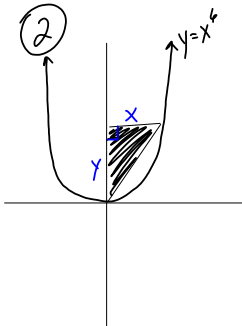
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad (x, \sqrt{x})$$

$$d = \sqrt{(x-1)^2 + (\sqrt{x}-0)^2}$$

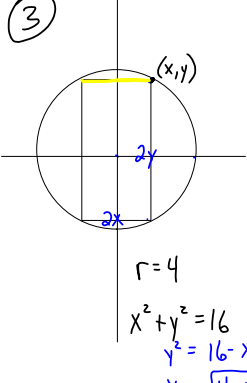
$$\sqrt{x^2 - 2x + 1 + x} = \sqrt{x^2 - x + 1}$$

For what values of x is d the smallest?

$x = \underline{.5}$



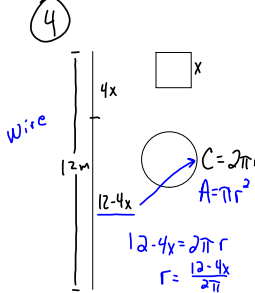
② Find Area of the Triangle.
Use $A = \frac{1}{2}bh$
 $A = \frac{1}{2} \times x \times y \leftarrow y = x^6$
 $A = \frac{1}{2}x^7$



③ Area of the rectangle?
Use $A = lw$
 $A = xy$
 $A = 2x(2\sqrt{16-x^2})$
 $A = 4x\sqrt{16-x^2}$
Find the Perimeter.
 $P = 4x + 4\sqrt{16-x^2}$

$r = 4$
 $x^2 + y^2 = 16$
 $y^2 = 16 - x^2$
 $y = \sqrt{16 - x^2}$

<u>Max Area</u>	<u>Max Perimeter</u>
$x = 2.83$	$x = 2.83$



④ Total Area of the Square.
 x^2

Total Area of the Circle.
 $A = \pi \left(\frac{6-2x}{\pi}\right)^2$

Combined Area:
 $x^2 + \pi \left(\frac{6-2x}{\pi}\right)^2$
 $x^2 + \pi \left(\frac{36-24x+4x^2}{\pi^2}\right)$
 $x^2 + \frac{36-24x+4x^2}{\pi}$

Domain: $(0, 3)$

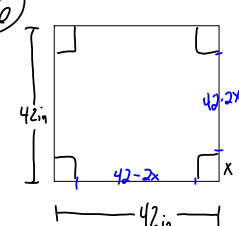
Minimum Value of x .
 $x = 1.68$ meters

$$(6-2x)^2$$

$$(6-2x)(6-2x)$$

$$36 - 12x - 12x + 4x^2$$

$$36 - 24x + 4x^2$$



⑥ Volume: $V = lwh$
 $V = (42-2x)(42-2x)x$

What is the Volume if we cut out a bin sq.?
 $V = (42-2(6))(42-2(6))(6)$
 $V = 5400$

Maximum:
 $x = 7$

