

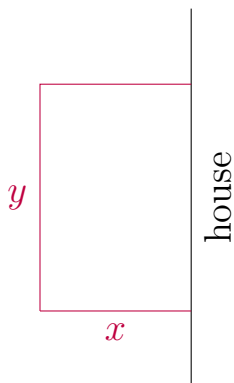
Quiz 11 Solution

November 3, 2017

1. (2 points) You have 80 ft of fence to make a rectangular vegetable garden alongside the wall of your house. The wall of the house bounds one side of the vegetable garden. What is the largest possible area of the vegetable garden?

Solution:

①



Constraint: $80 = 2x + y$

② Maximize $A = xy$

③ Solving the constraint equation for y , we get $y = 80 - 2x$. Substituting into the formula for A , we get $A = x(80 - 2x) = 80x - 2x^2$.

④ $x, y > 0$

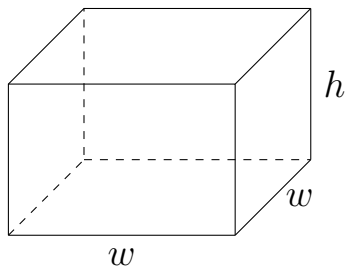
⑤ $A' = 80 - 4x \stackrel{\text{set}}{=} 0$
So $x = 20$.

⑥ $A(20) = 800 \text{ ft}^2$

Answer: The maximum area is 800 ft^2 .

2. (2 points) A rectangular box has a square base. If the volume is 54 ft^3 , what dimensions minimize the sum of the height and the perimeter of the square base?

①



Constraint: $54 = w^2h$

② Minimize $P = 4w + h$

③ Solving the constraint equation for h , ⑥ $w = 3, h = 6$

we get $h = \frac{54}{w^2}$. Substituting into the formula for P , we get $P = 4w + \frac{54}{w^2}$.

④ $w, h > 0$

⑤ $P' = 4 - \frac{108}{w^3} \stackrel{\text{set}}{=} 0$
 $\frac{4w^3 - 108}{w^3} = 0$

$w = 0$ (not in domain), $w = 3$

Answer: $w = 3, h = 6$

3. (1 point) Why did you choose Purdue?

Answer: Answers will vary.