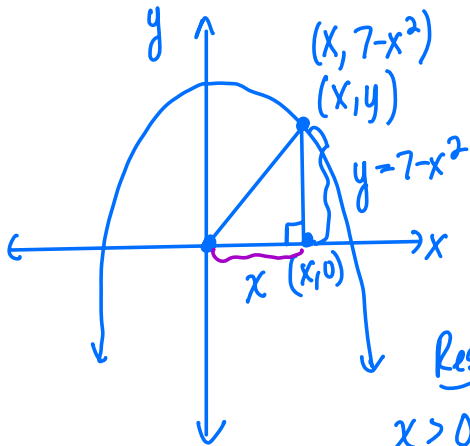


Do Now: #4 from the Modeling Functions Practice sheet 1

4. A right triangle has one vertex on the graph of $y = 7 - x^2$, where $x > 0$ at (x, y) , another at the origin, and the third on the positive x -axis at $(x, 0)$. Express the area of the triangle as function of x .



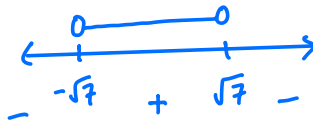
$$A = \frac{1}{2}bh$$

$$A(x) = \frac{1}{2}x(7-x^2) = \frac{7x-x^3}{2}$$

$(0, \sqrt{7})$

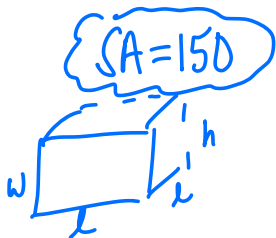
Restrictions

$$x > 0 \quad 7 - x^2 > 0$$



Continuing in that packet...

2. A closed rectangular shaped box is x units wide and 3 times as long. Let h be the altitude of this box. If the total surface area of this box is 150 square units, express the volume of the box as a function of x .



$$SA = 2lw + 2lh + 2hw$$

$$150 = 2 \cdot 3x \cdot x + 2 \cdot 3x \cdot h + 2h \cdot x$$

$$150 = 6x^2 + 6xh + 2xh$$

$$150 = 6x^2 + 8xh$$

$$V = lwh$$

$$V = 3x \cdot x \cdot (h) \quad \text{need } h \text{ in terms of } x$$

$$V(x) = 3x \cdot \cancel{x} \cdot \left(\frac{75 - 3x^2}{4} \right)$$

$$V(x) = \frac{3x(75 - 3x^2)}{4}, (0, 5)$$

$$\frac{150 - 6x^2}{8x} = \frac{8xh}{8x}$$

$$h = \frac{150 - 6x^2}{8x} = \frac{75 - 3x^2}{4x}$$

Restrictions : $x > 0$

$$3x > 0$$

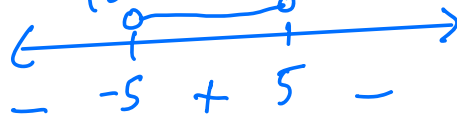
$$x > 0$$

$$\frac{75 - 3x^2}{4x} > 0$$

$$75 - 3x^2 > 0$$

$$25 - x^2 > 0$$

$$(5-x)(5+x) > 0$$



$$(-5, 5)$$

Exam 2A

③ $f(x) = 3x^2 + 1$ $f(x+y) = 3x^2 + 24x + 49$, $y?$

$$f(x+y) = 3(x+y)^2 + 1 = 3x^2 + 6xy + 3y^2 + 1$$

$$\cancel{3x^2} + 6xy + 3y^2 + 1 = \cancel{3x^2} + 24x + 49$$

$$6xy = 24x$$

$$y = 4$$

$$3y^2 + 1 = 49$$

$$3y^2 = 48$$

$$y^2 = 16$$

$$y = \pm 4$$

Exam 1B

⑤ $x + 2x^{2/5} - 16x^{3/5} - 32$

$$x^{2/5} (x^{3/5} + 2) - 16 (x^{3/5} + 2)$$

$$(x^{2/5} - 16)(x^{3/5} + 2)$$

$$(x^{1/5} - 4)(x^{1/5} + 4)(x^{3/5} + 2)$$

$$(x^{1/10} - 2)(x^{1/10} + 2)(x^{1/5} + 4)(x^{3/5} + 2)$$

Exam 2A

Period 9 Questions

(12) $f(x) = \frac{4x}{x+1}$

$$\frac{f(x+h) - f(x)}{h}$$

$$\frac{\frac{(4x+4h) \cancel{(x+h+1)(x+1)}}{\cancel{x+h+1}} - \frac{4x \cancel{(x+h+1)(x+1)}}{\cancel{x+1}}}{h(x+h+1)(x+1)} \quad \begin{array}{l} h \neq 0 \\ x \neq -1, -h-1 \end{array}$$

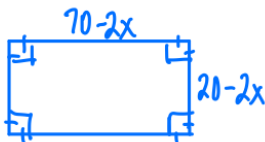
$$\frac{\cancel{4x^2} + 4xh + \cancel{4x} + 4h - \cancel{4x^2} - \cancel{4xh} - \cancel{4x}}{h(x+h+1)(x+1)}$$

$$\frac{4h}{h(x+h+1)(x+1)} = \frac{4}{(x+h+1)(x+1)}$$

Homework 11-08

$$V = lwh$$

1. A rectangular piece of cardboard has dimensions of 20 cm by 70 cm. Congruent squares of x cm on each side are cut from each of the 4 corners of this rectangle and the sides are folded up to form an open rectangular box. Express the volume of this box as a function of x .

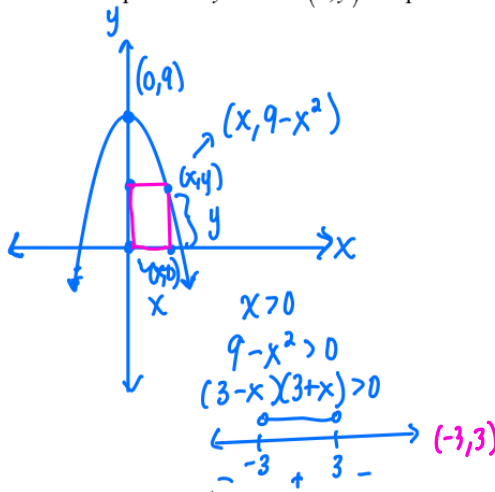


$$V(x) = x(70 - 2x)(20 - 2x), \quad 0 < x < 10$$

Restrictions

$$\begin{array}{ll} x > 0 & 20 - 2x > 0 \\ 70 - 2x > 0 & 20 > 2x \\ 70 > 2x & 10 > x \\ 35 > x & \end{array}$$

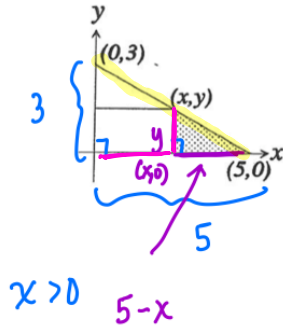
5. A rectangle has one corner on the graph of $y = 9 - x^2$, where $x > 0$, at (x, y) , another corner at the origin, a third corner on the positive x -axis at $(x, 0)$, and a fourth corner on the positive y -axis at $(0, y)$. Express the area of the rectangle as function of x .



$$A = lw$$

$$A(x) = x(9 - x^2), \quad 0 < x < 3$$

9. Express the area of the shaded region as a function of x .



AA Δ Similarity

$$\frac{3}{y} = \frac{5}{5-x}$$

$$5y = 15 - 3x$$

$$y = \frac{15 - 3x}{5}$$

$$5 - x > 0$$

$$5 > x$$

$$x < 5$$

$$15 - 3x > 0$$

$$-3x > -15$$

$$x < 5$$

$$A = \frac{1}{2} bh$$

$$A(x) = \frac{1}{2} (5-x) \left(\frac{15-3x}{5} \right)$$

$$A(x) = \frac{(5-x)(15-3x)}{10}$$

$$0 < x < 5$$