

Name _____

Instructor _____

Section _____

Questions 16 and 17 are free response. Page 7 and the graph paper should be turned in with your Answer Sheet. To receive credit please show all (correct) work.

16. (12 pts) Let $f(x) = \sqrt{x+2}$

a. Determine the equation for $f^{-1}(x)$. To receive credit show proper work or explanation.

$$y = \sqrt{x+2}$$

$$x = \sqrt{y+2}$$

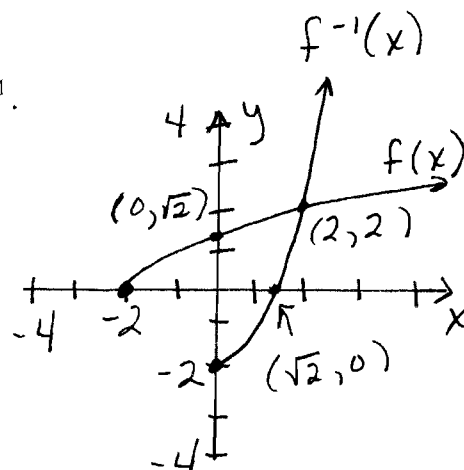
$$x^2 = y+2$$

$$x^2 - 2 = y$$

$$f^{-1}(x) = x^2 - 2$$

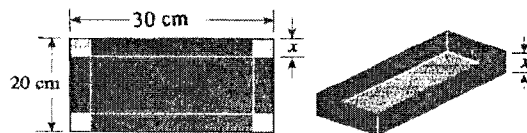
b. Use interval notation to give the domain and range of f and f^{-1} .

	f	f^{-1}
Domain	$[-2, \infty)$	$[0, \infty)$
Range	$[0, \infty)$	$[-2, \infty)$



c. On the graph paper sketch the graphs of f and f^{-1} .

17. (13 pts) An open box is to be constructed from a piece of cardboard, that is 20 cm by 30 cm, by cutting squares of side length x from each corner and folding up the sides, as shown in the figure.



a. Express the volume V of the box as a function of x .

$$V = l \cdot w \cdot h$$

$$V(x) = (30 - 2x)(20 - 2x)x$$

$$V(x) = 4x^3 - 100x^2 + 600x$$

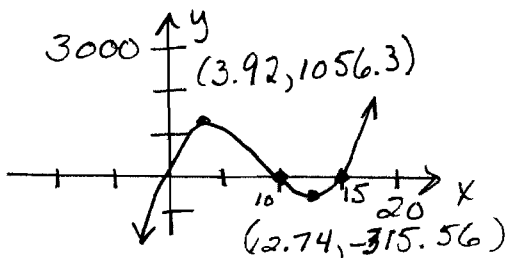
$$l = 30 - 2x$$

$$w = 20 - 2x$$

$$h = x$$

b. On the graph paper sketch a graph of the function $V(x)$. Make sure to label all intercepts and indicate all turning points.

c. Find the dimensions of the box that maximizes the volume of the box.



The box should be 22.16 cm by 12.16 cm by 3.92 cm.