HOMEWORK 2

1.1 (30) $g(u) = \sqrt{u} + \sqrt{4-u}$

Need: $u \geq 0$ and $4-u \geq 0$

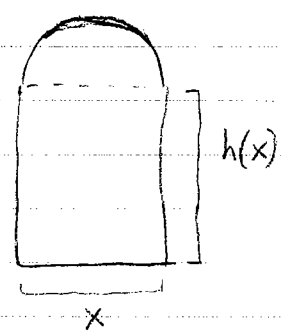
$4 \geq u$

So $0 \leq u \leq 4$

The domain is $\{u \in \mathbb{R} \mid 0 \leq u \leq 4\}$

(50) $f(x) = \begin{cases} -\frac{3}{2}x - 3 & \text{if } x < -2 \\ \sqrt{4-x^2} & \text{if } -2 \leq x \leq 2 \\ \frac{3}{2}x - 3 & \text{if } x > 2 \end{cases}$

(56)



Denote the height of the rectangle by $h(x)$.

The area of the semicircle part is $\frac{1}{2}\pi\left(\frac{x}{2}\right)^2 = \frac{\pi x^2}{8}$ since its radius is $\frac{x}{2}$.

The area of the rectangular part is $x\,h(x)$, so the total area $A(x) = \frac{\pi x^2}{8} + x\,h(x)$

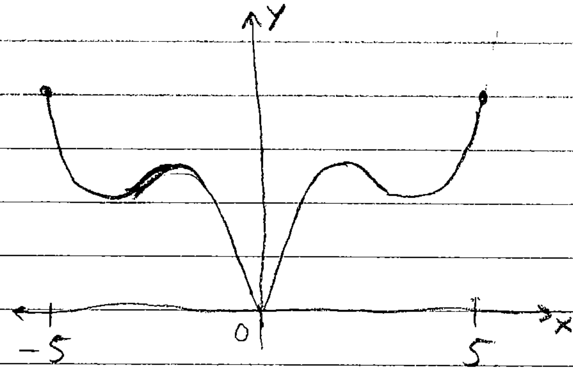
Now we must determine what $h(x)$ is.
The perimeter of the window is 30 ft.
so,

$$30 = x + 2h(x) + \underbrace{\pi\left(\frac{x}{2}\right)}_{\text{half the circumference of a circle of radius } \frac{x}{2}}$$

Therefore, solving for $h(x)$ gives $h(x) = 15 - \frac{x}{2} - \frac{\pi x}{4}$

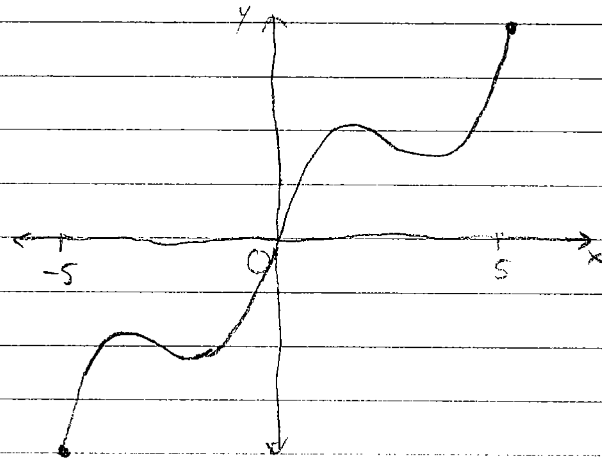
$$A(x) = \frac{\pi x^2}{8} + x\left(15 - \frac{x}{2} - \frac{\pi x}{4}\right) = \boxed{15x - \frac{x^2}{2} - \frac{\pi x^2}{8}}$$

64. (a)



Even

(b)



Odd.

70. $f(x) = 1 + 3x^3 - x^5$

$f(-x) = 1 + 3(-x)^3 - (-x)^5$

$= 1 - 3x^3 + x^5$

This is not equal to $f(x)$ or $-f(x)$, so

f is neither even nor odd.

1.2 (2) (a) $y = \frac{x-6}{x+6}$ rational function

(b) $y = x + \frac{x^2}{\sqrt{x-1}}$ algebraic

(c) $y = 10^x$ exponential

(d) $y = x^{10}$ power (and polynomial with degree = 10)

(e) $y = 2t^6 + t^4 - \pi$ polynomial, degree = 6

(f) $y = \cos\theta + \sin\theta$ trigonometric

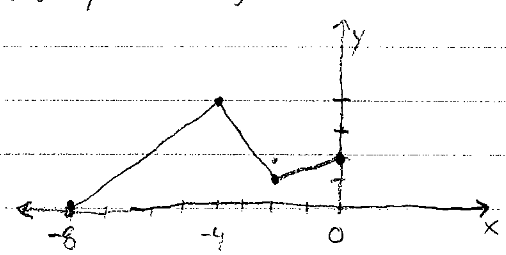
(4) (a) $y = 3x$ $\boxed{G}$ Straight line with slope 3

(b) $y = 3^x$ $\boxed{f}$ Exponential functions have a range of $(0, \infty)$

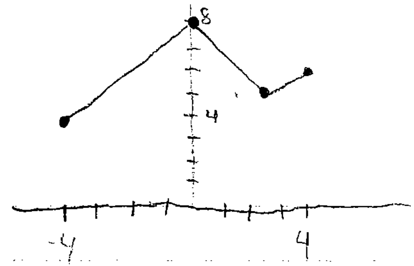
(c) $y = x^3$ $\boxed{F}$ As $|x|$ gets larger, the graph gets steeper.

(d) $y = \sqrt[3]{x}$ $\boxed{g}$ This is the basic shape for odd root functions.

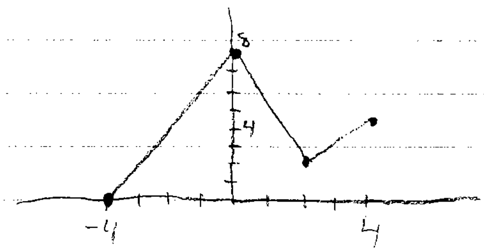
1.3 (4) (a) $y = f(x+4)$ shift left by 4



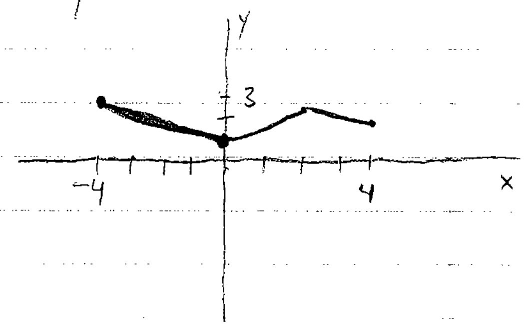
(4) (b) $y = f(x) + 4$
shift up by 4



(c) $y = 2f(x)$
vertically stretch by 2



(d) $y = -\frac{1}{2} f(x) + 3$
Reflect over y-axis, vertically compress to half its height and then shift up by 3

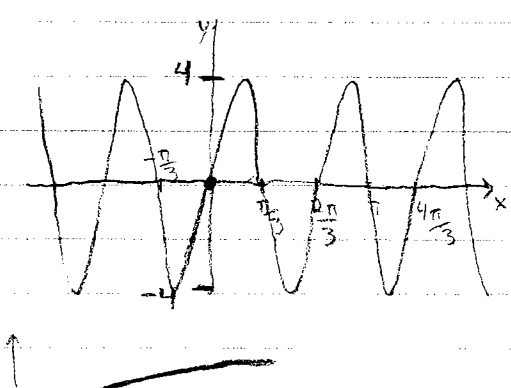


(6) $y = \sqrt{3x - x^2}$ is the original graph

The desired graph is shifted right by 2 and stretched vertically by 2.

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

(14) $y = 4 \sin 3x$



(20) $y = 1 + \sqrt[3]{x-1}$