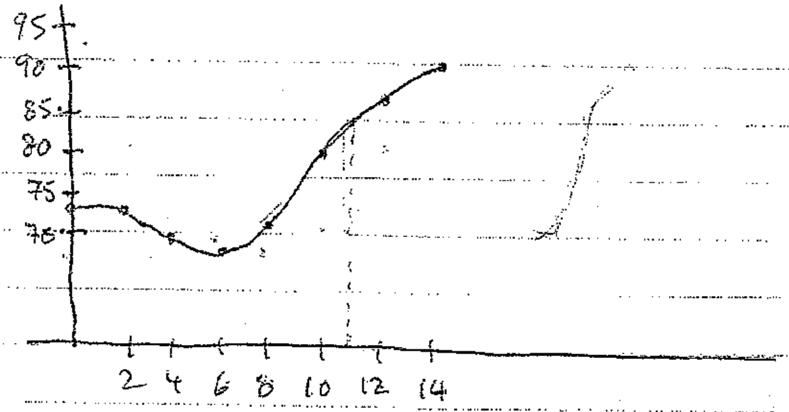
SOLUTIONS #1

1.1

18. a)



b) $T(11) \sim 85$ (your answer "should" be bigger than 84.5)

24. $f(x) = \dfrac{5x+4}{(x+2)(x+1)}$

$(x+2)(x+1) = 0 \implies x = -2, -1$

$$\boxed{\begin{aligned} \therefore \text{Dom} f &= \{x \in \mathbb{R} \mid x \neq -2, -1\} \\ &= (-\infty, -2) \cup (-2, -1) \cup (-1, \infty) \end{aligned}}$$

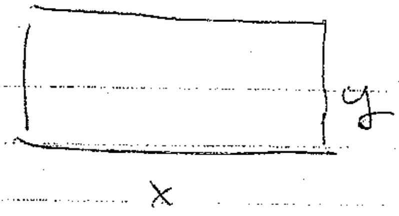
26. $g(u) = \sqrt{u} + \sqrt{4-u}$

$\therefore$ $u > 0$ and $4 - u > 0$

$u > 0$ and $4 > u$

$$\boxed{\begin{aligned} \therefore \text{Dom}\, g &= \{u \in \mathbb{R} \mid 0 < u < 4\} \\ &= (0, 4) \end{aligned}}$$

48.



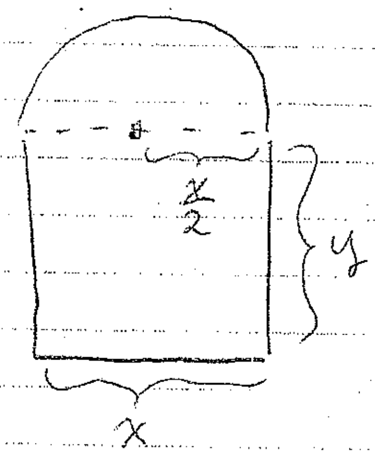
Perimeter $= 2x + 2y$

but Area $= xy = 16$

$\therefore y = \frac{16}{x} \quad (x > 0)$

$$\therefore \boxed{\text{Perimeter} = P(x) = 2x + \frac{32}{x}}$$

52.



$$\text{Area} = xy + \frac{\pi\left(\frac{x}{2}\right)^2}{2}$$

but Perimeter $= (x + 2y) + \frac{1}{2}\left(2\pi \frac{x}{2}\right)$

$= x + 2y + \frac{\pi x}{2} = 30$

$\therefore y = \frac{1}{2}\left(30 - x - \frac{\pi x}{2}\right)$

$$\boxed{\therefore \text{Area} = A(x) = \frac{x}{2}\left(30 - x - \pi x/2\right) + \pi x^2/8}$$

1.3

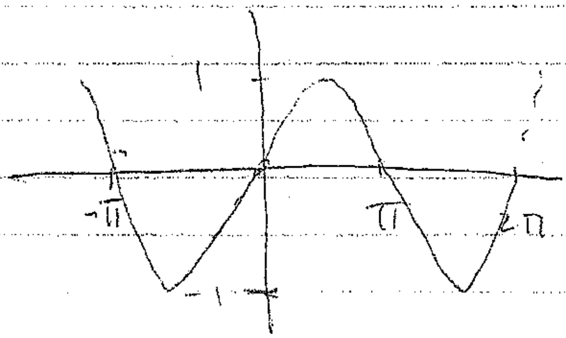
6. $y = 2\sqrt{3(x-2)-(x-2)^2}$

$= 2\sqrt{(x-2)(5-x)}$

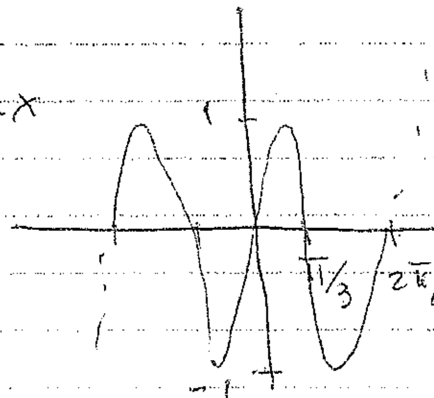
7. $y = -\sqrt{3(x+4)-(x+4)^2} - 1$

$= -\sqrt{-(x+4)(x+1)} - 1$

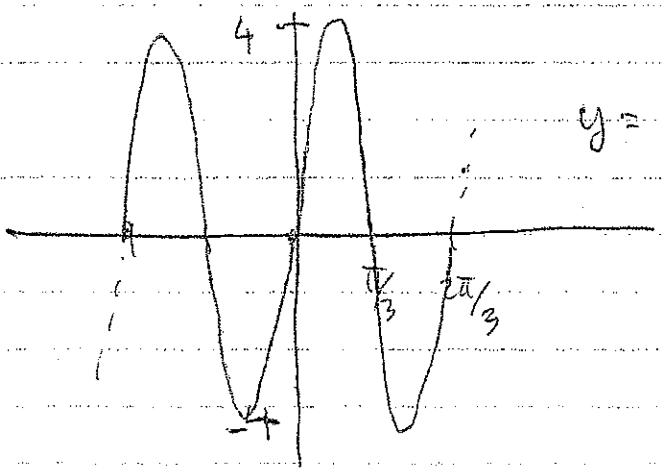
14.



$y = \sin x$

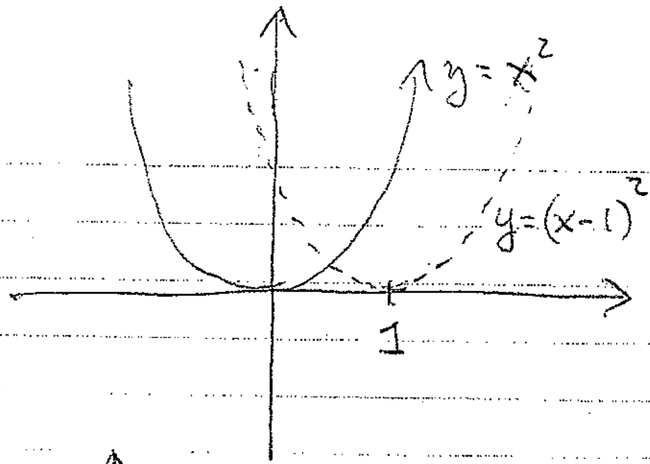


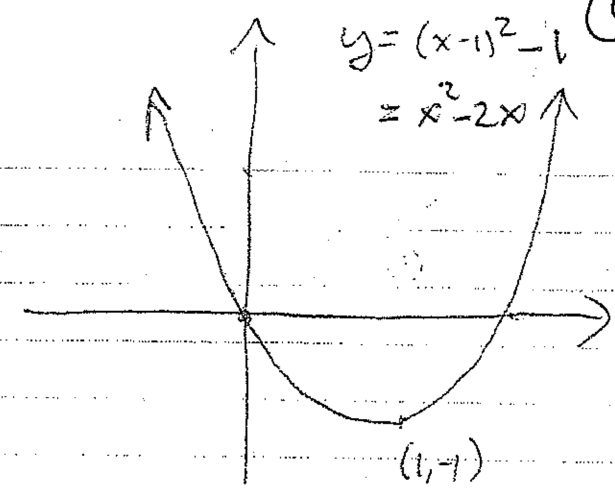
$y = \sin 3x$

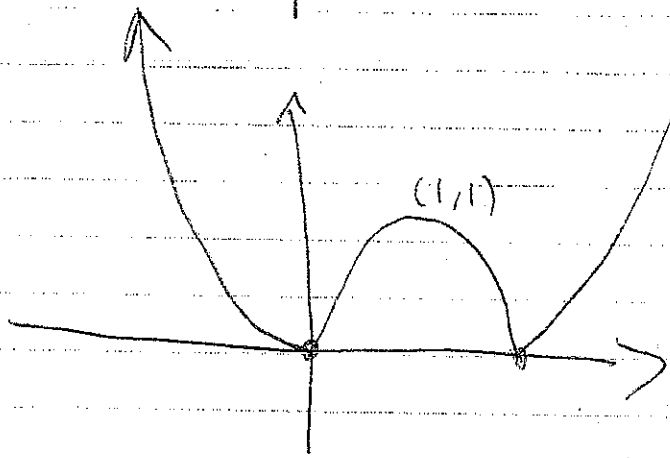


$y = 4\sin 3x$

24.







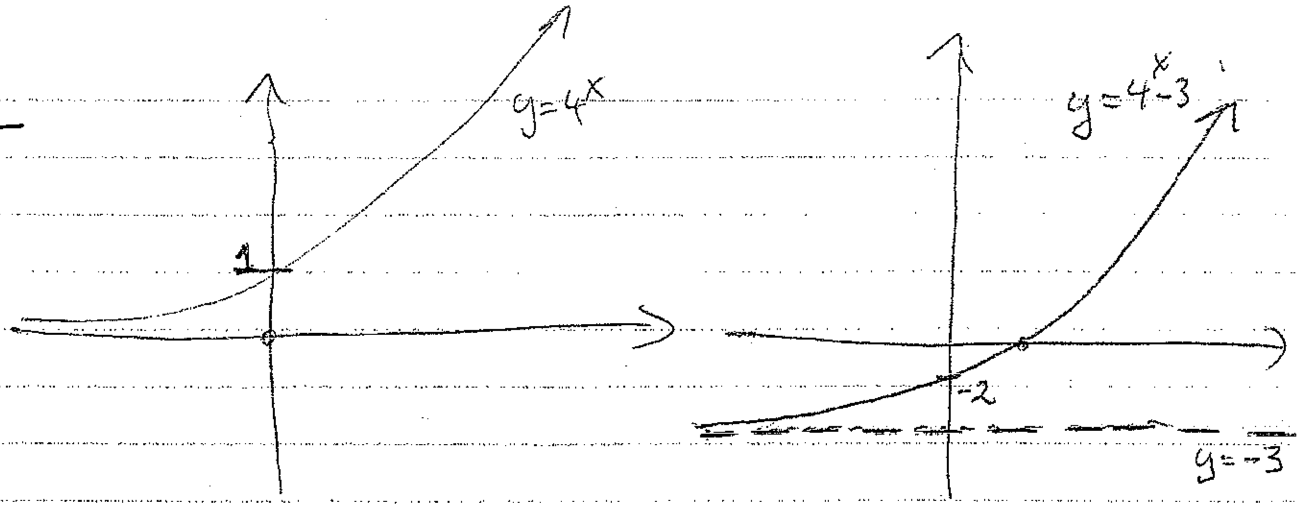
$y = |x^2-2x|$

53.
$$\begin{cases} f(x) = x^4 \\ g(x) = \sec x \\ h(x) = \sqrt{x} \end{cases}$$

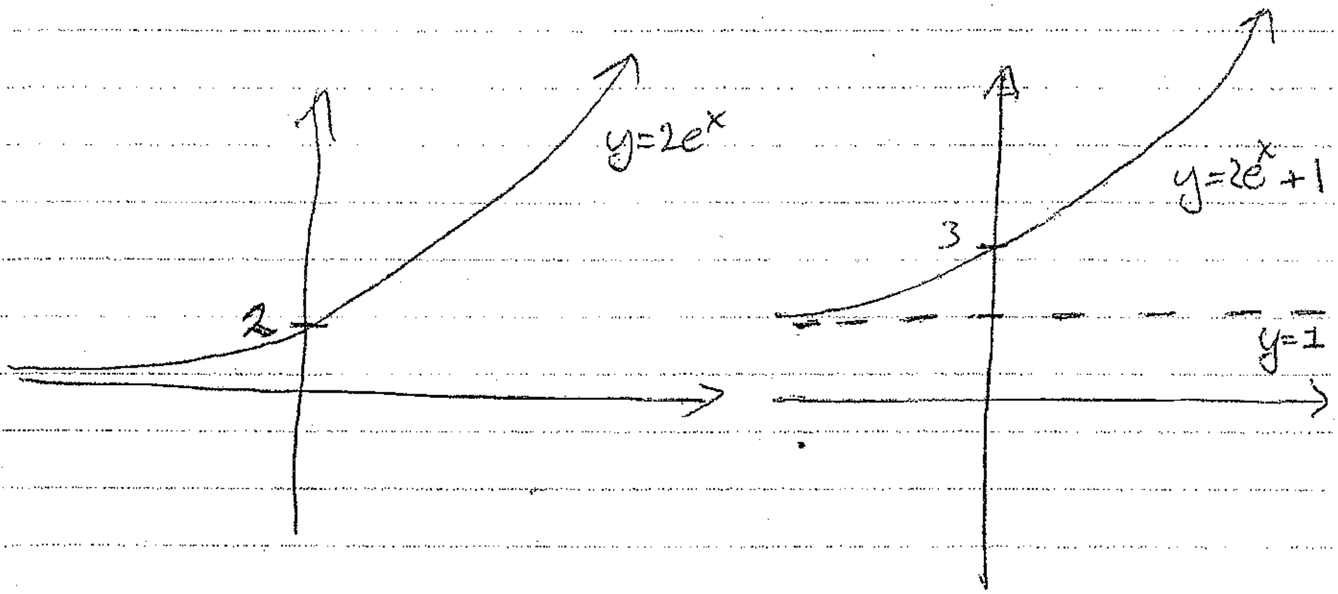
49.
$$\begin{cases} f(t) = \sqrt{t} \\ g(t) = \cos t \end{cases}$$

1.5

7.



10.



15. $1+e^x > 1$ for all $x \in \mathbb{R}$.

$\therefore\ f(x) = \dfrac{1}{1+e^x}$ has Domain $= \mathbb{R}$.

$$\boxed{\text{Dom} f = \mathbb{R}}$$

Appendix A.

(62) Show that if $|x+3| < \frac{1}{2}$, then $|4x+13| < 3$.

Solution: $|4x+13| < 3$

$\Leftrightarrow -3 < 4x+13 < 3$

$\Leftrightarrow -16 < 4x < -10 \Leftrightarrow -4 < x < -\frac{5}{2}$

and $|x+3| < \frac{1}{2}$

$\Leftrightarrow -\frac{1}{2} < x+3 < \frac{1}{2}$

$\Leftrightarrow -\frac{7}{2} < x < -\frac{5}{2}$

Since $\left(-\frac{7}{2}, -\frac{5}{2}\right) \subseteq \left(-4, -\frac{5}{2}\right)$

we get that $|x+3| < \frac{1}{2} \Rightarrow |4x+13| < 3$.