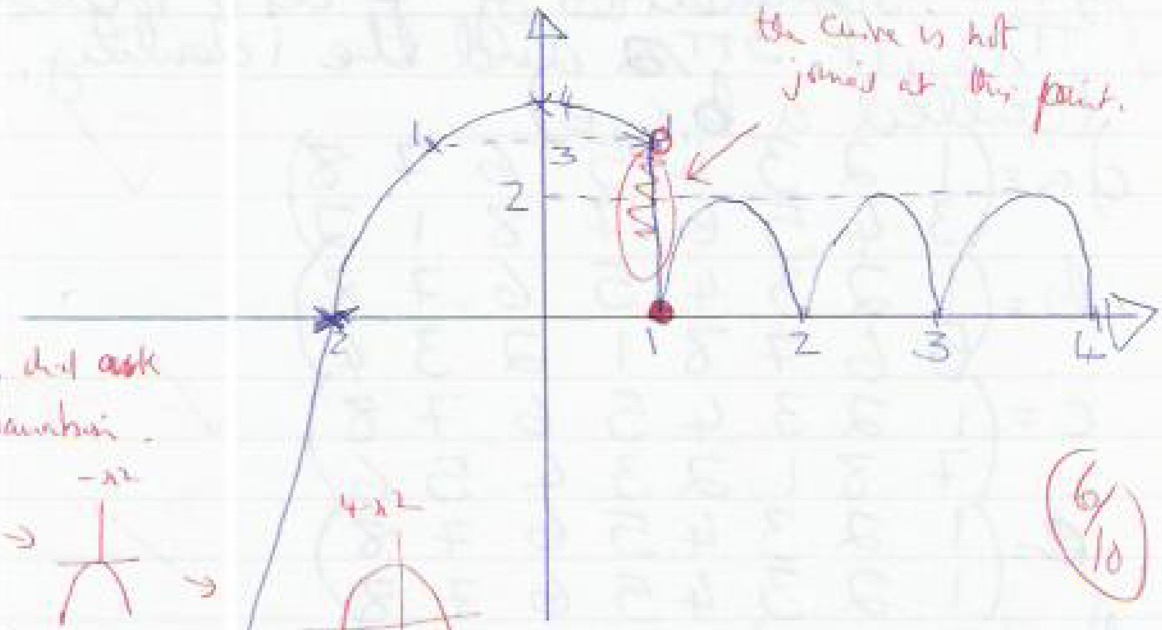
2) $f(x) = \begin{cases} 4 - x^2 & x < 1 \\ |2 \sin \pi x| & x \geq 1. \end{cases}$

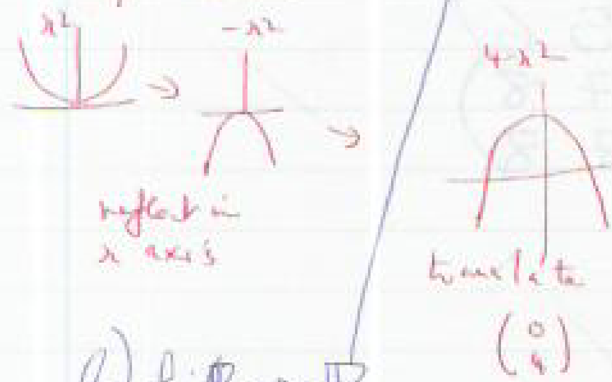
The graph of $4 - x^2$ is straight forward. By examination the graph of $|2 \sin \pi x|$ oscillates between 0 and 2 between every integer value of x. $x = 1$

the curve is not joined at this point.



The question did ask for an explanation.

e.g



$\frac{6}{10}$

b) $f : \mathbb{R} \to \mathbb{R}$ $\qquad$ $g : \mathbb{R} \to \mathbb{R}$

$x \to 3 + \cos 2x$ $\qquad$ $x \to 2x - 3$

f one to one iff for all elements a, b in the domain $f(a) = f(b)$ implies $a = b$. This is not true for $(3 + \cos 2x)$, since $\cos 2x$ is a cyclic function and has infinitely many values of x for any value of $f(x)$ possible

eg $3 + \cos 2 \times 0 = 3 + \cos 2\pi$ (ie $f(0) = f(\pi)$)

g is one to one $(2a - 3 = 2b - 3 \Rightarrow 2a = 2b \Rightarrow a = b)$

Also $f(x) = 3 + \cos 2x$ is not onto, since there is no value of x for which $f(x) > 4$ or $f(x) < 2$

$f(x) = 2x - 3$ is onto, since both domain and codomain are infinite. $g\left(\frac{1}{2}(x+3)\right) = x$.

see p12 of unit 1.

$\frac{8}{10}$