son test, $\sum_{n=1}^{\infty} \frac{\cos n}{n^2}$ converges. abs. + so is cgt.

$4\frac{1}{4}$ / 5 $\quad \frac{17\frac{1}{2}}{25}$

4) a) i) $f(x) = \begin{cases} x^2 + 2x & x < 0 \\ \cos x - 1 & x \geq 0 \end{cases}$

polynomials and trigonometric functions are basic continuous functions. Hence both are continuous on their domains. It remains to be checked that there is no discontinuity at $x = 0$.

Yes but you need to Local Rule to get f cts on $]-\infty, 0[$ & $]0, \infty[$

4 | 4 ||

$x^2 + 2x = 0 + 0 = 0$

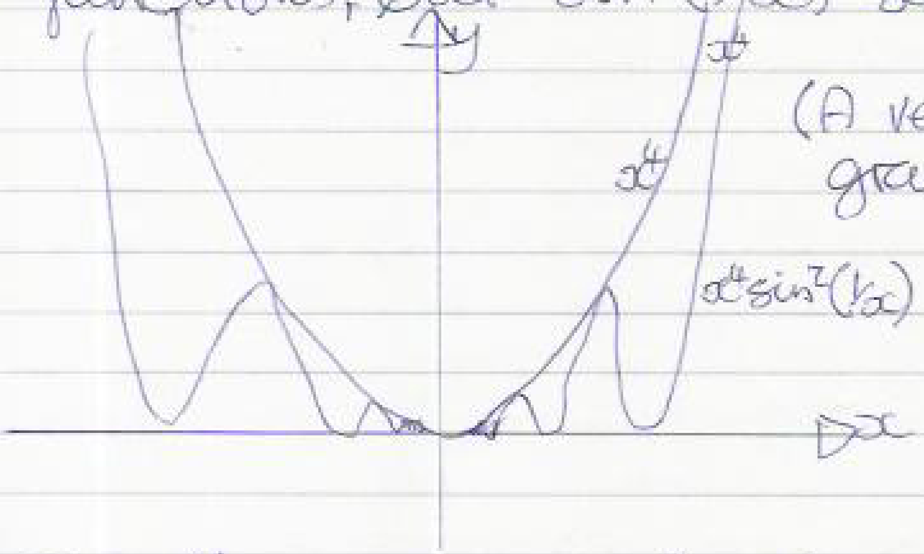
$\cos x - 1 = \cos 0 - 1 = 1 - 1 = 0$

Hence the function is continuous.

Then need GLUE RULE for $a=0$

ii) $f(x) = \begin{cases} x^4 \sin^2(1/x), & x \neq 0 \\ 0 & x = 0 \end{cases}$

$f(x) = x^4 \sin^2(1/x)$ $x \neq 0$ is the product of two functions, x^4 and $\sin^2(1/x)$. x^4 is continuous, since polynomials are basic continuous functions, but $\sin^2(1/x)$ seems less so.



(A very approximate graph).

Good start.

Again we need to Local Rule to get f cts on $]-\infty, 0[$ & $]0, \infty[$

Try the squeeze rule. We want $g(x)$ and $h(x)$ which 'squeeze' $f(x)$.

$0 \leq \sin^2(1/x) \leq 1$. $\quad x = 0$. $(|\sin \theta| \leq 1)$.

so $0 \leq x^4 \sin^2(1/x) \leq x^4 \quad (x^4 \geq 0)$.

and $0 \leq f(x) \leq x^4$