CW1

common errors

1. (a) Given that $f(x) = \sqrt{x+1}$ and $g(x) = x^2 - 5$. Find the domain of $f \circ g$ in <u>interval notation</u>.

Error: many of you wrote either

- Inequalities e.g. $x \leq -2$ or $x \geq 2$
- Set notation i.e. $\{x|\ x \leq -2\ or\ x \geq 2\}$

But the required answer should be in the form of <u>intervals</u>!

Correct ans: $(-\infty, -2] \cup [2, \infty)$

1. (b) Given that $f(x) = |x^2 - a|,\ a > 0$. Express the value of $f(0)$ and $f(\sqrt{a} + 1)$ in terms of a, <u>without absolute value</u> sign.

<u>Error 1</u>: many of you wrote $f(0) = |0^2 - a| = |-a| = |a|$

This is incorrect because there is still an absolute value sign surrounding a.

Correct ans: a (because $a > 0$, therefore $|a| = a$)

<u>Error 2</u>: many of you wrote $f(\sqrt{a} + 1) = |1 + 2\sqrt{a}|$

Correct ans: $1 + 2\sqrt{a}$, because $\sqrt{a} > 0$ implying $1 + 2\sqrt{a} > 0$, hence
$$|1 + 2\sqrt{a}| = 1 + 2\sqrt{a}$$

3. Consider the function $f(x) = \begin{cases} e^x, & if\ x \geq 1 \\ |x|, & if\ -\frac{\pi}{2} < x < 1, \\ \sin x, & if\ x \leq -\frac{\pi}{2} \end{cases}$

(a) Sketch the graph of $f(x)$.

Main error: This function has a "jump" at the point when $x = 1$. This is

because $\lim\limits_{x \to 1^+} e^x = e > 1$ and $\lim\limits_{x \to 1^-} |x| = 1$.