Dr Halbeisen*

Modules 110PMA003 & 110PMA107
Department of Pure Mathematics

Week 7, 2001

Please hand in your solutions (stapled together with your full name on the first page) at the lecture on Thursday, 15 November 2001.

---

29. Given that $f(x) = x - 6$, $g(x) = x^3$ and $h(x) = \dfrac{x}{2}$. Find the output from each of the following functions:

    (a) $f \circ g$ (b) $g \circ f$ (c) $f \circ g \circ h$ (d) $f \circ f$ (e) $h \circ h \circ g$

30. For which pair of functions is it true that $f \circ g = g \circ f$:

    (a) $f(x) = 6x,\quad g(x) = 3 + x$
    (b) $f(x) = \frac{x}{3},\quad g(x) = 4x$
    (c) $f(x) = 3 + x,\quad g(x) = 3 - x$

31. Write down the domain and the range of each of the following functions:

    (a) $f(x) = \sin(x)$ (b) $f(x) = 1 + \frac{1}{|x|}$ (c) $f(x) = (1-x)^2$ (d) $f(x) = 1 - x^2$

32. Let $f(x) = \big||x| - 1\big|$. Plot the graph of the following functions:

    (a) $f(x)$ (b) $f\big(f(x)\big)$ (c) $f\big(f(f(x))\big)$

    (d) What happens if you do this process again and again?

33. Sketch the graph of the function $f(x) = \sin\big(\frac{5}{2}\cos(x)\big)$ between $x = -5$ and $x = 5$.

    Hint: Remember that $\cos(x) = \cos(-x)$, thus, it is enough to sketch the graph between $x = 0$ and $x = 5$ and then reflect it on the vertical axis. To sketch the graph between $x = 0$ and $x = 5$, it should be enough to compute $f(x)$ for $x = 0,\ 0.25,\ 0.5,\ 0.75,\ 1,\ \ldots,4.75,\ 5$.

---

*David Bates Building, Room 1014.

Office hours (Room 1007): Monday 1 pm–2 pm, Wednesday 2 pm–3 pm