

I want to get a more precise idea of your mathematical background than what I have at the moment, and so I would be grateful if you would look at each of the following questions. Do **not** actually do any of the questions or even spend much time thinking about them. Instead, circle none, one or two of the possibilities which follow the question, which are:

Have seen this before Can probably do it Can't do it

I am not so much concerned with whether you can do these questions as whether you think you can do them!

When you have finished circling the appropriate statements, you may want to discuss the problems in your class and with Dan. At the end of the recitation, please hand this sheet to Dan, so that I can see your responses.

Peter Webb

(A) Let $f(x)$ be a function of a variable x . Which (if any) of the following means the same thing as ' $f(x)$ tends to a limit L as x tends to a '?

(1) There is a number $\epsilon > 0$ for which there exists a number $\delta > 0$ so that $|f(x) - L| < \epsilon$ for every x with $0 < |x - a| < \delta$.

(2) For each $\epsilon > 0$ there exists a number $\delta > 0$ so that $|f(x) - L| < \epsilon$ for some x with $0 < |x - a| < \delta$.

Have seen this before Can probably do it Can't do it

(B) Find the radius of convergence of the power series $\sum_{n=0}^{\infty} \frac{n}{3n+1} x^n$?

Have seen this before Can probably do it Can't do it

(C) Evaluate $\int_0^1 \sec^4 x \tan x \, dx$.

Have seen this before Can probably do it Can't do it

(D) Evaluate $\int_0^1 x e^x \, dx$.

Have seen this before Can probably do it Can't do it

(E) Evaluate $\int_0^1 \frac{dx}{(x+1)(x+2)}$.

Have seen this before Can probably do it Can't do it

(F) Find an explicit expression for $\sum_{r=1}^N (r^2 - r)$

(in the same way that, for example, $\sum_{r=1}^N (3r^2 - 2r) = \frac{N(N+1)(2N-1)}{2}$).

Have seen this before Can probably do it Can't do it

(G) Find the limit (if it exists) of the sequence of complex numbers $\frac{1}{(1+i)^n}$.

Have seen this before Can probably do it Can't do it

(H) Determine whether or not the following series converges: $\sum_{n=1}^{\infty} \frac{n+3}{n^3+5n-1}$.

Have seen this before Can probably do it Can't do it

(I) If you wish, write 2 or 3 sentences (only!) on the back to give me an idea of where you are mathematically. It is optional to tell me your name. What course have you taken before? Have you written proofs of things before? Anything else?