

Panel 10

Homework

① Let  $v$  be the harmonic conjugate of  $u$ . Show that

$$h = u^2 - v^2 \text{ is harmonic}$$

② Find the following limits:

a)  $\lim_{n \rightarrow \infty} \left( \frac{1}{2} + \frac{i}{4} \right)^n$       b)  $\lim_{n \rightarrow \infty} \frac{n + (i)^n}{n}$

c)  $\lim_{n \rightarrow \infty} \frac{(ni)(kin)}{n^2}$       d)  $\lim_{n \rightarrow \infty} \frac{n^2 + i2^n}{2^n}$

③ Show that  $\sum_{n=0}^{\infty} \left( \frac{1}{n+1+i} - \frac{1}{n+i} \right) = i$  (Hint: Find  $S_1, S_2, S_3, \dots$ )

④ Show that if  $\sum_{n=1}^{\infty} z_n$  converges then  $\lim_{n \rightarrow \infty} z_n = 0$

(Hint:  $z_n = S_{n+1} - S_n$ )

⑤ Show that  $\lim_{n \rightarrow \infty} z_n = 0$  iff  $\lim_{n \rightarrow \infty} |z_n| = 0$