Physics 504 Ordinary Homework #3
Due: March 3, 2011

1. (Jackson 8.9) Before we start, some notes.

   - Jackson's use of harmonic in this problem does not mean a solution of laplaces equation, as the word is used by mathematicians. He means only that the field is complex, varying as $e^{-i\omega t}$, with the real part representing the physical field.
   - That the bounding surface may have more than one connected part implies there may be conductors inside an outer conductor. This does not affect the demonstration requested in part (a) given here, but it does affect the prospects for suggesting that k^2 is a minimum.
   - Do problem 8.10 part a first, to show the numerator is real and there is some hope that a variational principle might look for a minimum.

2. (Jackson 8.14) You might find useful the integral

$$\int_0^\pi \frac{d\theta}{1 + c\sin^2\theta} = \frac{\pi}{\sqrt{1+c}},$$

provided $c > -1$.