

1 derivation for the potential of a point charge above thin layer of uniform dielectric above an anisotropic substrate  
2 bulk material

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15 using the furrier transform

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apply boundary conditions

as

and

as

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applying the conditions

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and

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30 (2)

31 \_ \_ \_ \_ \_ \_

32 (1)+(5)

33 \_ \_ \_ \_ \_ \_

34 (1)-(5)

35 \_ \_ \_ \_ \_ \_

36 (4)

37 \_ \_ \_\_\_\_\_

38 (8)+(3)

39 \_ \_ \_\_\_\_\_ \_ \_ \_ \_

40 (3)-(8)

41 \_ \_ \_\_\_\_\_ \_ \_ \_ \_

42 sub 9 in to 6

43 \_ \_ \_\_\_\_\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

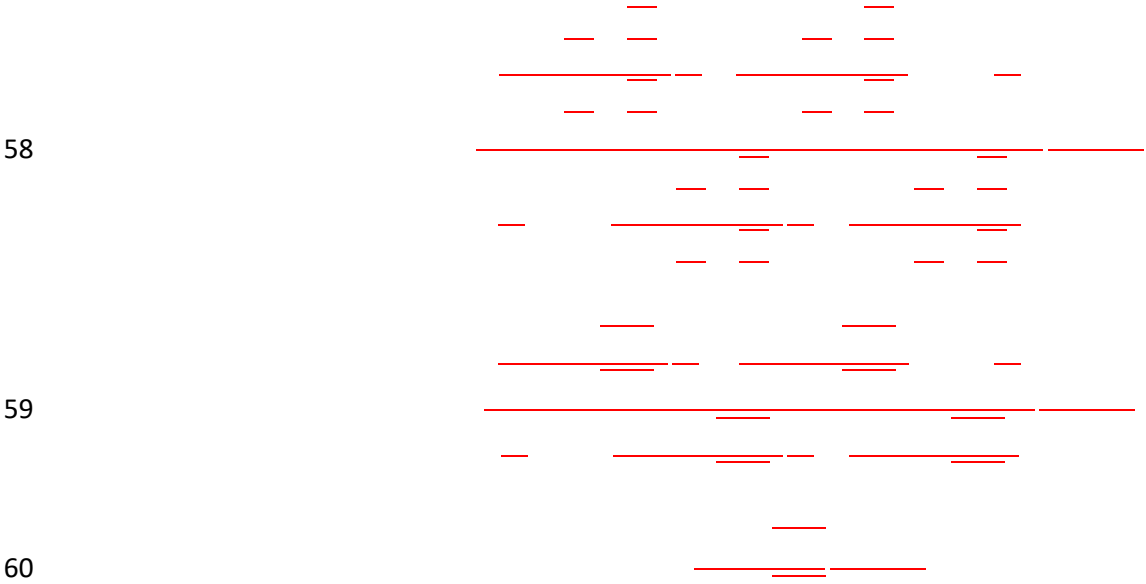
44 \_ \_ \_\_\_\_\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

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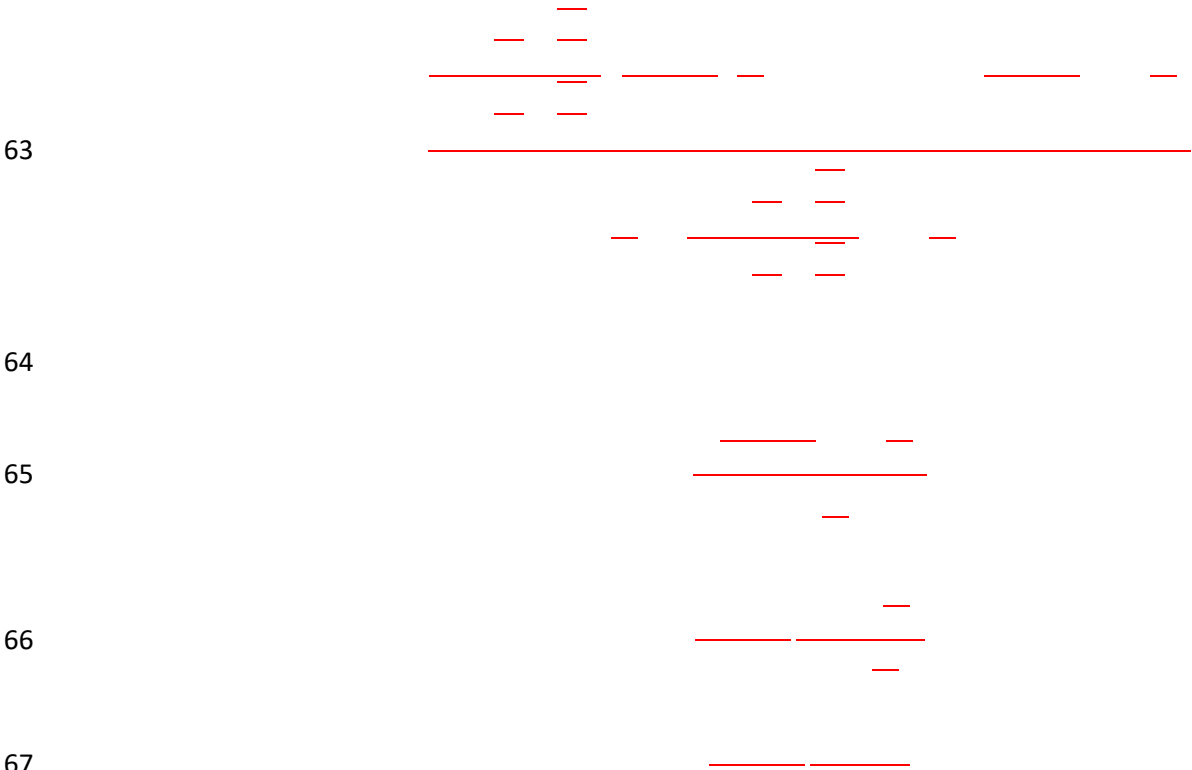
47 sub 10 in to 7





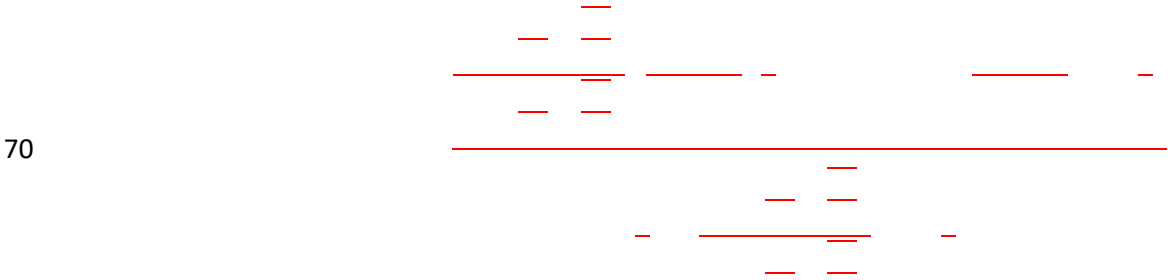
61 which is the result which is expected when the layer is no longer present

62 let



68 result as expected when the layer depth goes to infinity

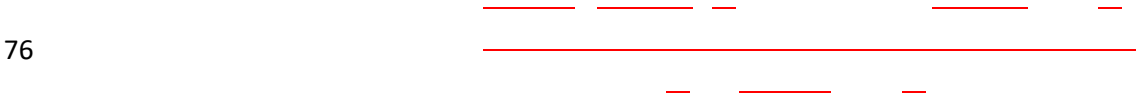
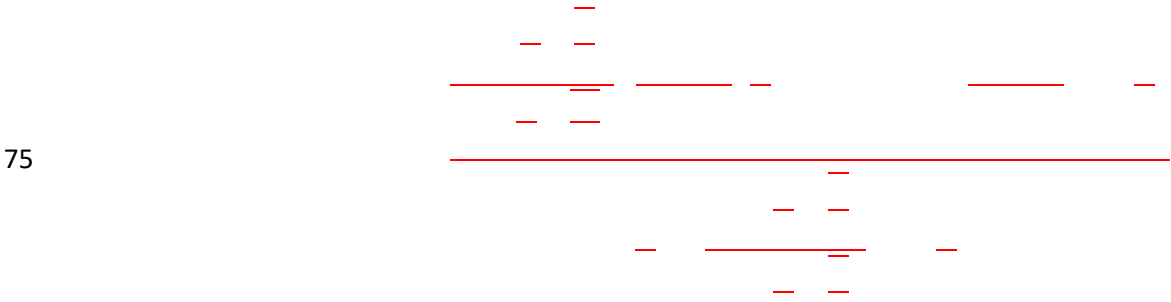
69 let



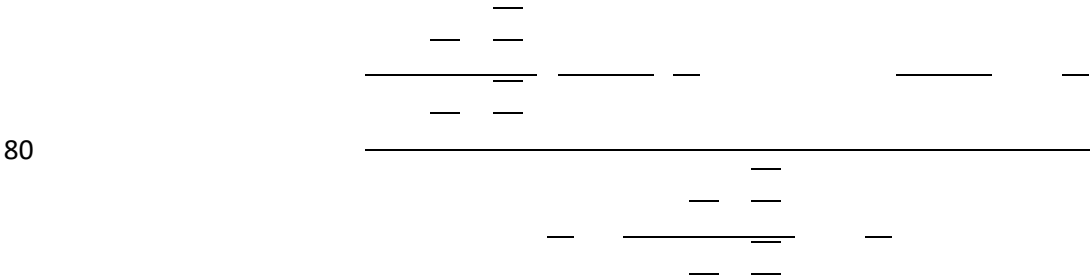


73 only issue here is that h is 2 times what is expected

74 let

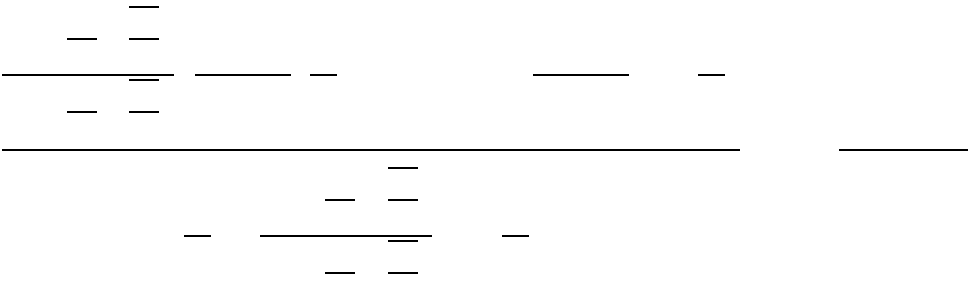


79 all trivial cases return the expected results

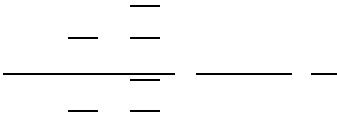


81 sub 14 in to

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let

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90 test cases

91 let

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99 returns expected result

100 let

101

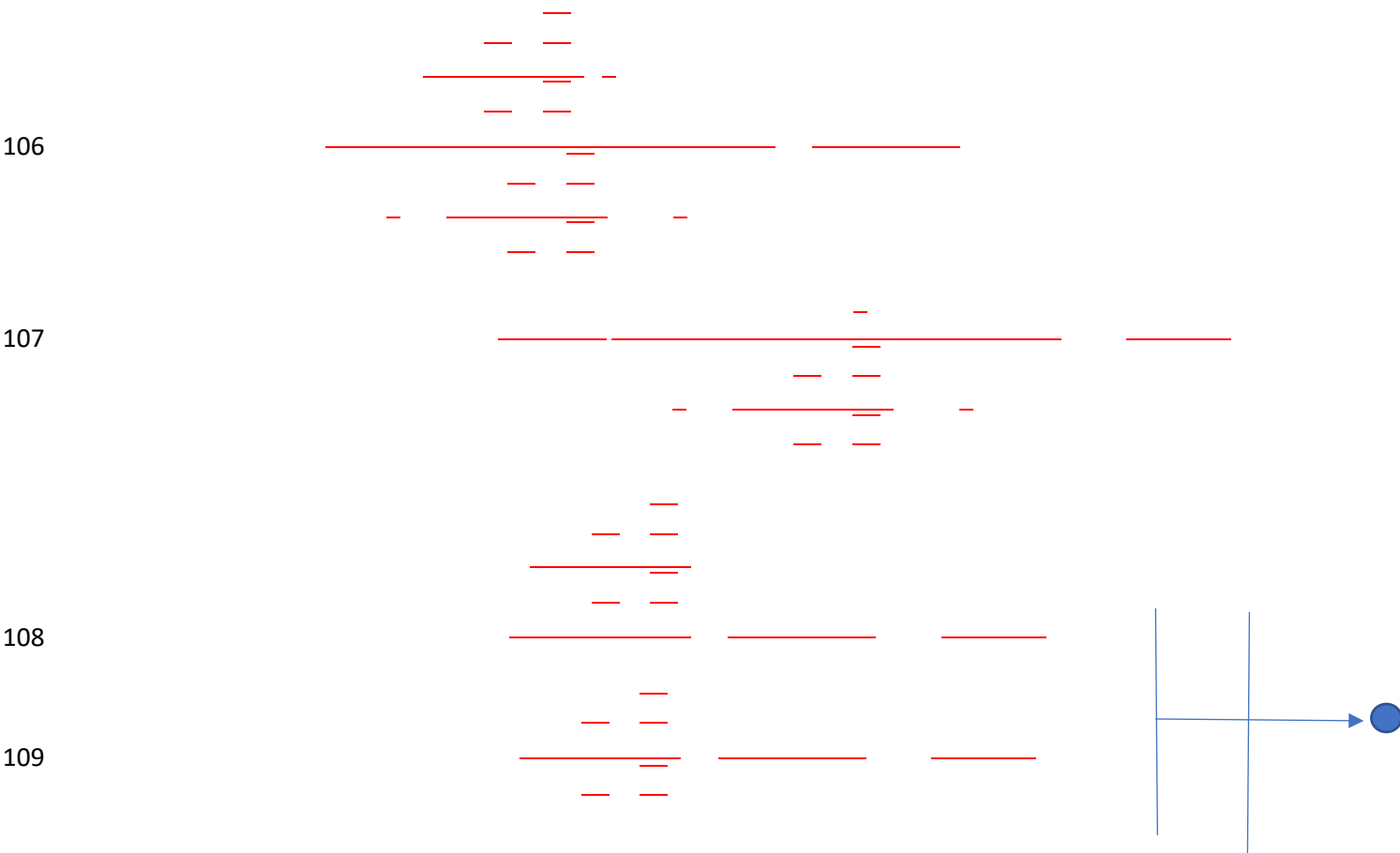
102

103

104 returns expected result

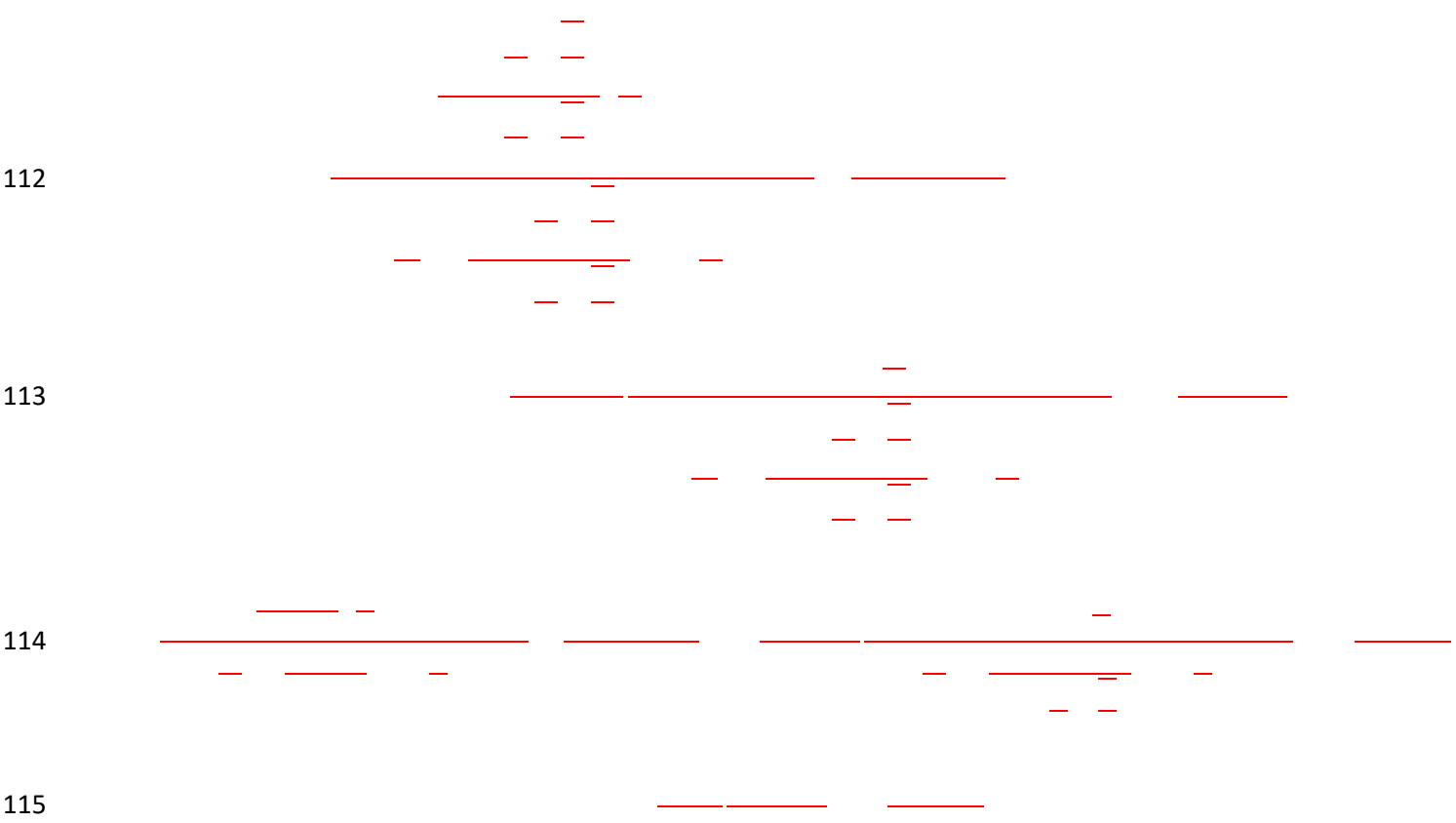
105 let





110 returns expected result however (z+ would be normal expected result

111 let



114

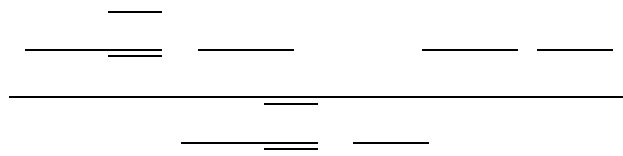
115

116

117 returns expected result

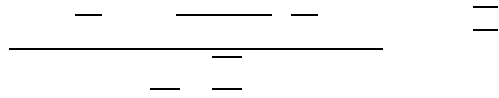


118

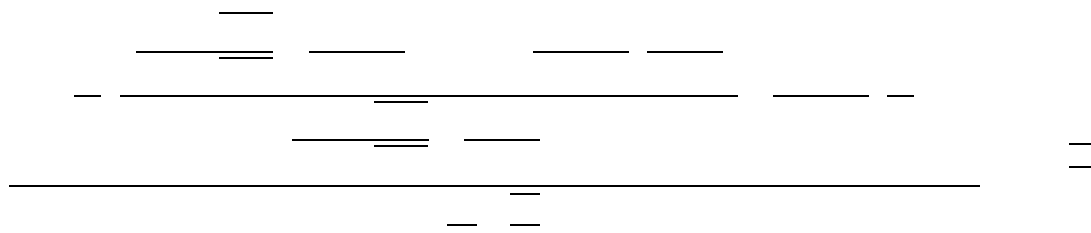


119 find A

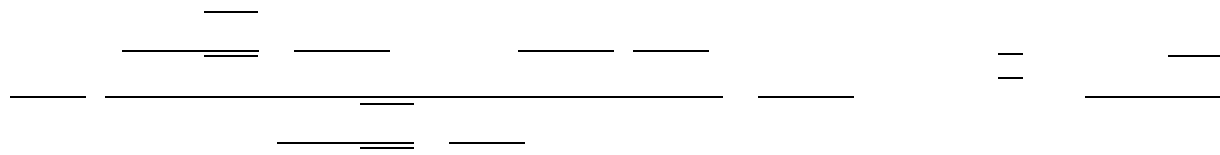
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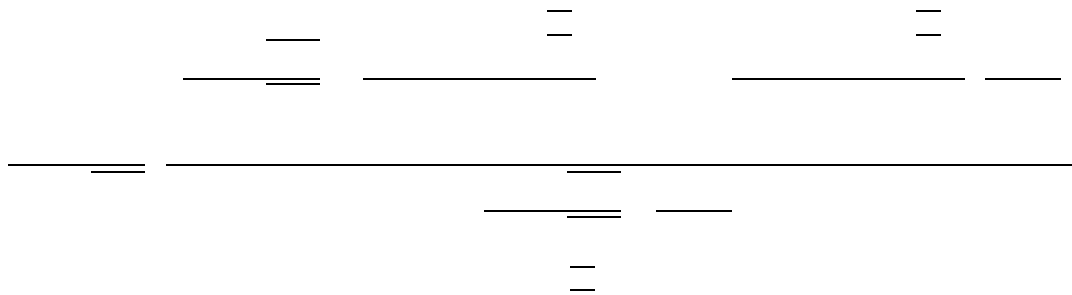
121



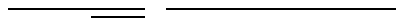
122



123



124



F

132 therefore integral is

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$$= \frac{1}{2\pi i} \int_{\gamma} \frac{f(z)}{z^2} dz$$

134 
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139

140 contour integration and the residue theorem

141 letting 
$$f(z) = \frac{1}{z^2}$$

142 
$$= \frac{1}{2\pi i} \int_{\gamma} \frac{f(z)}{z^2} dz$$

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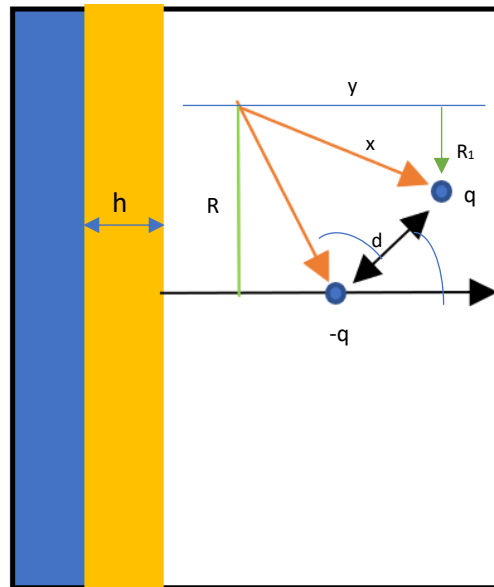




185					
186					
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188	returns the expected results				
189	let				
190					
191					
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195	result as expected				
196	let				
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200					



### Dipole approximation using the principle of superposition



where

as                      then

let \_\_\_\_\_

first particle

second particle





\_\_\_\_\_

third term

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\_\_\_\_\_

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therefore

let

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calculating the electric fields due to the dipole

$$\frac{1}{r} = \frac{1}{\sqrt{z^2 + \rho^2}} = \frac{1}{z} \left( 1 + \frac{\rho^2}{z^2} \right)^{-1/2} = \frac{1}{z} \left( 1 - \frac{1}{2} \frac{\rho^2}{z^2} + \frac{3}{8} \frac{\rho^4}{z^4} - \dots \right)$$

where  $\rho^2 = x^2 + y^2$  and  $z = \sqrt{z^2 + \rho^2}$

$$\frac{1}{r} = \frac{1}{z} \left( 1 - \frac{1}{2} \frac{\rho^2}{z^2} + \frac{3}{8} \frac{\rho^4}{z^4} - \dots \right)$$

first term

$$\frac{1}{r} = \frac{1}{z} \left( 1 - \frac{1}{2} \frac{\rho^2}{z^2} + \frac{3}{8} \frac{\rho^4}{z^4} - \dots \right)$$

$$\frac{1}{r} = \frac{1}{z} \left( 1 - \frac{1}{2} \frac{\rho^2}{z^2} + \frac{3}{8} \frac{\rho^4}{z^4} - \dots \right)$$

$$\frac{1}{r} = \frac{1}{z} \left( 1 - \frac{1}{2} \frac{\rho^2}{z^2} + \frac{3}{8} \frac{\rho^4}{z^4} - \dots \right)$$

$$\frac{1}{r} = \frac{1}{z} \left( 1 - \frac{1}{2} \frac{\rho^2}{z^2} + \frac{3}{8} \frac{\rho^4}{z^4} - \dots \right)$$

second term

$$\frac{1}{r} = \frac{1}{z} \left( 1 - \frac{1}{2} \frac{\rho^2}{z^2} + \frac{3}{8} \frac{\rho^4}{z^4} - \dots \right)$$

$$\frac{1}{r} = \frac{1}{z} \left( 1 - \frac{1}{2} \frac{\rho^2}{z^2} + \frac{3}{8} \frac{\rho^4}{z^4} - \dots \right)$$

final term

$$\frac{1}{r} = \frac{1}{z} \left( 1 - \frac{1}{2} \frac{\rho^2}{z^2} + \frac{3}{8} \frac{\rho^4}{z^4} - \dots \right)$$

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Figure 1

Figure 2

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first term

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second term

Age (years)	Percentage (%)
18	10
20	25
25	45
30	65
35	85
40	95
45	100
50	100
55	100
60	100
65	100

final term

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third term

let                      and as this is the case where the NP are interacting with them selves

The diagram consists of 12 horizontal bars arranged in a sequence. The bars are of varying lengths and positions, representing a musical staff with notes and rests. The bars are arranged in a sequence that suggests a musical rhythm or melody. The bars are arranged in a sequence that suggests a musical rhythm or melody.

where

The image displays two horizontal timelines illustrating the evolution of the 'L' (L'Espresso) brand. The top timeline, labeled 'L' (L'Espresso) 1970-1990, shows a period of growth and peak performance, with a high point in 1980. The bottom timeline, labeled 'L' (L'Espresso) 1990-2010, shows a period of decline and low performance, with a low point in 2000.

let  $\mathcal{A}$  and as  $\mathcal{B}$

first term

[illegible]

second term

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\_\_\_\_\_

third term

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