

In[1]:= 3 + 5

Out[1]= 8

In[45]:= one := (4 / 3) \* Pi \* (1 / x^6) \* (x / Series[HankelH1[1, x], {x, ∞, 2}])^2

In[48]:= one

$$\text{Out[48]} = e^{-2 i x} \left( -\frac{2 i \pi^2}{3 x^3} - \frac{\pi^2}{2 x^4} + O\left[\frac{1}{x}\right]^5 \right)$$

In[46]:= two := (4 \* Pi / (5 \* x^6)) \* (x^2 / (x \* Series[D[HankelH1[2, x], x], {x, ∞, 2}] + Series[HankelH1[2, x], {x, ∞, 2}]))^2

In[49]:= two

$$\text{Out[49]} = (4 \pi) / \left( 5 x^2 \left( e^{i x} \left( (-1)^{1/4} \sqrt{\frac{2}{\pi}} \sqrt{x} - \frac{19 (-1)^{3/4} \sqrt{\frac{1}{x}}}{4 \sqrt{2 \pi}} + O\left[\frac{1}{x}\right]^{3/2} \right) + e^{i x} \left( (-1)^{3/4} \sqrt{\frac{2}{\pi}} \sqrt{\frac{1}{x}} - \frac{15 (-1)^{1/4} \left(\frac{1}{x}\right)^{3/2}}{4 \sqrt{2 \pi}} + O\left[\frac{1}{x}\right]^{5/2} \right) \right)^2 \right)$$

In[51]:= one + two

$$\text{Out[51]} = (4 \pi) / \left( 5 x^2 \left( e^{i x} \left( (-1)^{1/4} \sqrt{\frac{2}{\pi}} \sqrt{x} - \frac{19 (-1)^{3/4} \sqrt{\frac{1}{x}}}{4 \sqrt{2 \pi}} + O\left[\frac{1}{x}\right]^{3/2} \right) + e^{i x} \left( (-1)^{3/4} \sqrt{\frac{2}{\pi}} \sqrt{\frac{1}{x}} - \frac{15 (-1)^{1/4} \left(\frac{1}{x}\right)^{3/2}}{4 \sqrt{2 \pi}} + O\left[\frac{1}{x}\right]^{5/2} \right) \right)^2 \right) + e^{-2 i x} \left( -\frac{2 i \pi^2}{3 x^3} - \frac{\pi^2}{2 x^4} + O\left[\frac{1}{x}\right]^5 \right)$$

In[57]:= Simplify[one + two]

$$\text{Out[57]} = e^{-2 i x} \left( -\frac{16 i \pi^2}{15 x^3} - \frac{8 \pi^2}{5 x^4} + O\left[\frac{1}{x}\right]^5 \right)$$