WolframAlpha

|k|*|(4*(d−λ/4))|/(e^(i*2*k*r)*2*((d−λ/4)/(sqrt(a*r))))*e^(i*k*a), d

Input:

$$\left\{|k| \times \frac{\left|4\left(d-\frac{\lambda}{4}\right)\right|}{e^{i \times 2 k r} \times 2 \times \frac{d-\frac{\lambda}{4}}{\sqrt{a r}}} e^{i k a}, d = 1, \lambda = 1, a = 2, r = 1, k r = 1\right\}$$

Exact result:

$$\left\{\frac{2 \sqrt{a r}\, |k|\, e^{i a k - 2 i k r} \left|d-\frac{\lambda}{4}\right|}{d-\frac{\lambda}{4}}, d = 1, \lambda = 1, a = 2, r = 1, k r = 1\right\}$$

Substitution:

$$\frac{8 \sqrt{a r}\, |k|\, e^{i k (a-2 r)} \left|d-\frac{\lambda}{4}\right|}{4 d-\lambda} = 2 \sqrt{2}$$

Solution

$$4\cdot 3\cdot\int_{4\pi}^{0}\int_{16\pi^2}^{4\pi}\int_{0}^{16\pi^2}\frac{1}{4e^{\alpha\cdot 1\cdot 0.999}e^{2\beta\cdot 0.999-\gamma\cdot 0.999}}d\alpha d\beta d\gamma=5.31263\ldots E-6$$

Steps

$$4\cdot 3\cdot\int_{4\pi}^{0}\int_{16\pi^2}^{4\pi}\int_{0}^{16\pi^2}\frac{1}{4e^{\alpha\cdot 1\cdot 0.999}e^{2\beta\cdot 0.999-\gamma\cdot 0.999}}d\alpha d\beta d\gamma$$

$$\int_{0}^{16\pi^2}\frac{1}{4e^{\alpha\cdot 1\cdot 0.999}e^{2\beta\cdot 0.999-\gamma\cdot 0.999}}d\alpha=\frac{0.2502495}{e^{-0.999\gamma+1.998\beta}}$$

Show Steps

$$=4\cdot 3\cdot\int_{4\pi}^{0}\int_{16\pi^2}^{4\pi}\frac{0.2502495}{e^{-0.999\gamma+1.998\beta}}d\beta d\gamma$$

$$\int_{16\pi^2}^{4\pi}\frac{0.2502495}{e^{-0.999\gamma+1.998\beta}}d\beta=-1.56188\ldots E-12e^{0.999\gamma}$$

Show Steps

$$=4\cdot 3\cdot\int_{4\pi}^{0}-1.56188\ldots E-12e^{0.999\gamma}d\gamma$$

$$\int_{4\pi}^{0}-1.56188\ldots E-12e^{0.999\gamma}d\gamma=4.42719\ldots E-7$$

Show Steps

$$=4\cdot 3\cdot 4.42719\ldots E-7$$

$$4\cdot 3\cdot 4.42719\ldots E-7=5.31263\ldots E-6$$

Show Steps

$$=5.31263\ldots E-6$$

WolframAlpha

(e^(i*k*(d-2*r)))*(e^(i*k*(d-r))), d=1, r=10^(-34)*6.626, k*r=0

Input:

$$\left\{e^{i\,k\,(d-2\,r)}\,e^{i\,k\,(d-r)},\ d=1,\ r=\frac{6.626}{10^{34}},\ k\,r=0\right\}$$

Result:

$$\left\{e^{i\,k\,(d-2\,r)+i\,k\,(d-r)},\ d=1,\ r=6.626\times 10^{-34},\ k\,r=0\right\}$$

Substitution:

$$e^{i\,k\,(2\,d-3\,r)}\approx 1\,,\quad e^{i\,k\,(2\,d-3\,r)}\approx e^{(2\,i)\,k}$$

WolframAlpha(Eq 37)

sqrt(a*r)*sqrt(|(|(2*(d-λ/4))|^4*(e^(i*2*k*r)))|/(4*pi*r^2)*|16*pi^2/(|(2*(d-λ/4))|^4*k^2*(e^(i*2*k*a)))|)/

Assuming i is the imaginary unit | Use i as a variable instead

Input:

$$\left\{\sqrt{a\,r}\times\frac{\sqrt{\frac{\left|\left|2\left(d-\frac{\lambda}{4}\right)\right|^4 e^{i\times 2\,k\,r}\right|}{4\,\pi\,r^2}\left|16\times\frac{\pi^2}{\left|2\left(d-\frac{\lambda}{4}\right)\right|^4 k^2\,e^{i\times 2\,k\,a}}\right|}}{3\sqrt{\pi}\,d},\ d=0.9,\ a=2,\ r=1,\ k\,r=1\right\}$$

$|z|$ is the absolute value of z

i is the imaginary unit

Result:

$$\left\{\frac{2\sqrt{a\,r}\left|d-\frac{\lambda}{4}\right|^2\sqrt{\frac{e^{2\,\mathrm{Im}(a\,k)-2\,\mathrm{Im}(k\,r)}}{r^2}}\sqrt{\left|\frac{1}{k^2\left|d-\frac{\lambda}{4}\right|^4}\right|}}{3\,d},\ d=0.9,\ a=2,\ r=1,\ k\,r=1\right\}$$

$\mathrm{Im}(z)$ is the imaginary part of z

Substitution: Approximate form

$$\frac{2\sqrt{\frac{1}{r^2}}\sqrt{a\,r}\,e^{\mathrm{Im}(a\,k)-\mathrm{Im}(k\,r)}}{3\,d\,|k|}=\frac{20\sqrt{2}}{27}$$

sqrt(a*r)*sqrt(|(|(2*(d–λ/4))|^4*(e^(i*2*k*r)))|/(4*pi*r^2)*|16*pi^2

Input:

$$\left\{\sqrt{a\,r} \times \frac{\sqrt{\frac{\left|\left|2\left(d-\frac{\lambda}{4}\right)\right|^4 e^{i\times 2\,k\,r}\right|}{4\,\pi\,r^2} \left|16\times \frac{\pi^2}{\left|2\left(d-\frac{\lambda}{4}\right)\right|^4 k^2\, e^{i\times 2\,k\,a}}\right|}}{3\sqrt{\pi}\;d},\right.$$

$$\left. d = 0.999,\, a = 1,\, r = 1,\, k\,r = 1\right\}$$

Result:

$$\left\{\frac{2\sqrt{a\,r}\;\left|d-\frac{\lambda}{4}\right|^2 \sqrt{\frac{e^{2\,\mathrm{Im}(a\,k)-2\,\mathrm{Im}(k\,r)}}{r^2}}\;\sqrt{\left|\frac{1}{k^2\left|d-\frac{\lambda}{4}\right|^4}\right|}}{3\,d},\, d = 0.999,\, a = 1,\, r = 1,\, k\,r = 1\right\}$$

Substitution:

$$\frac{2\sqrt{\frac{1}{r^2}}\;\sqrt{a\,r}\;e^{\mathrm{Im}(a\,k)-\mathrm{Im}(k\,r)}}{3\,d\,|k|} = \frac{2000}{2997}$$

WolframAlpha

(|(|phi|^2*2*d/mu)^2 – (3* |psi|)^2*kappa^2|)^(1/4), sqrt(2)*ph

Input:

$$\left\{\sqrt[4]{\left|\left(|\phi|^2 \times 2 \times \frac{d}{\mu}\right)^2 - (3\,|\psi|)^2\,\kappa^2\right|}, \sqrt{2}\,\phi^2 = k^2\,\psi, \lambda = \frac{6.626}{10^{34}}, d = 0.9, \kappa^2 = \left|2\left(d - \frac{\lambda}{4}\right)\right|, \mu = \frac{1}{2}\left(N^2 - N\right), N = 4\right\}$$

Result:

$$\left\{\sqrt[4]{\left|\frac{4\,d^2\,|\phi|^4}{\mu^2} - 9\,\kappa^2\,|\psi|^2\right|}, \sqrt{2}\,\phi^2 = k^2\,\psi, \lambda = 6.626\times 10^{-34}, d = 0.9, \kappa^2 = 2\left|d - \frac{\lambda}{4}\right|, \mu = \frac{1}{2}\left(N^2 - N\right), N = 4\right\}$$

Substitution:

$$\sqrt[4]{\left|\frac{4\,d^2\,|\phi|^4}{\mu^2} - 9\,\kappa^2\,|\psi|^2\right|} \approx 2.00622\sqrt{|\psi|}$$

4*π * ((2/3*(N−1))^2* ln sqrt(Z^(2/3 * d))) /(4*π * (sqrt(δ))^(−1

Input:

$$\left\{4\,\pi \times \frac{\left(\frac{2}{3}\,(N-1)\right)^2 \log\left(\sqrt{Z^{2/3\,d}}\right)}{\frac{4\,\pi\left(N\times\frac{N-1}{6}\right)}{\sqrt{\delta}}+2\,\pi\times\frac{\frac{Z}{9}}{\delta}},\ d=1,\ Z=3,\ N=4,\ \delta=1\right\}$$

Exact result:

$$\left\{\frac{16\,\pi\,(N-1)^2\log\left(\sqrt{Z^{(2\,d)/3}}\right)}{9\left(\frac{2\,\pi\,(N-1)\,N}{3\,\sqrt{\delta}}+\frac{2\,\pi\,Z}{9\,\delta}\right)},\ d=1,\ Z=3,\ N=4,\ \delta=1\right\}$$

Substitution:

$$\frac{4\,\delta\,(N-1)^2\log\left(Z^{(2\,d)/3}\right)}{3\,\sqrt{\delta}\,(N-1)\,N+Z}=\frac{8\log(3)}{13}$$

(e^(i*N*pi*k*r)), r=10^(-34)*6.626, k*r=1, N=5

Input:

$$\left\{e^{i N \pi k r}, r = \frac{6.626}{10^{34}}, k r = 1, N = 5\right\}$$

Result:

$$\left\{e^{i \pi k N r}, r = 6.626 \times 10^{-34}, k r = 1, N = 5\right\}$$

Substitution:

$$e^{i \pi k N r} \approx -1$$

Wolfrm Alpha (Eq 50)

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2/3 * d))) /(4*\pi * (sqrt(\delta))^(-1)* (N*(N-1)/6)+2*\pi*(Z/9)/\delta) , d=0.99, Z=3, N=4, \delta=0.99

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Input

$$\left\{4\,\pi\times\frac{\left(\frac{2}{3}\,(N-1)\right)^2\log\left(\sqrt{Z^{2/3\,d}}\right)}{\frac{4\,\pi\left(N\times\frac{N-1}{6}\right)}{\sqrt{\delta}}+2\,\pi\times\frac{\frac{Z}{9}}{\delta}},\ d=0.99,\ Z=3,\ N=4,\ \delta=0.99\right\}$$

$\log(x)$ is the natural logarithm

Result

$$\left\{\frac{16\,\pi\,(N-1)^2\log\left(\sqrt{Z^{(2\,d)/3}}\right)}{9\left(\frac{2\,\pi\,(N-1)\,N}{3\,\sqrt{\delta}}+\frac{2\,\pi\,Z}{9\,\delta}\right)},\ d=0.99,\ Z=3,\ N=4,\ \delta=0.99\right\}$$

Substitution

Approximate form

$$\frac{4\,\delta\,(N-1)^2\log\left(Z^{(2\,d)/3}\right)}{3\,\sqrt{\delta}\,(N-1)\,N+Z}\approx 0.665695$$

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WolframAlpha

4∗π ∗ ((2/3∗(N−1))^2∗ ln sqrt(Z^(2/3 ∗ d))) /(4∗π ∗ (δ)^(−1)∗ (N

Input:

$$\left\{4\pi\times\frac{\left(\frac{2}{3}(N-1)\right)^2\log\left(\sqrt{Z^{2/3\,d}}\right)}{\frac{4\pi\left(N\times\frac{N-1}{6}\right)}{\delta}+\frac{Z}{\delta}},\ d=0.99,\ Z=3,\ N=4,\ \delta=0.5\right\}$$

Result:

$$\left\{\frac{16\pi(N-1)^2\log\left(\sqrt{Z^{(2\,d)/3}}\right)}{9\left(\frac{2\pi(N-1)N}{3\delta}+\frac{Z}{\delta}\right)},\ d=0.99,\ Z=3,\ N=4,\ \delta=0.5\right\}$$

4/9 *d* δ*(N−1)^2/(v * (N*(N−1)/2)) , N=4, v=8/9, d=0.9, δ=0.99

Input:

$$\left\{\frac{4}{9}\, d\, \delta \times \frac{(N-1)^2}{v\left(N \times \frac{N-1}{2}\right)},\ N = 4,\ v = \frac{8}{9},\ d = 0.9,\ \delta = 0.99\right\}$$

Result:

$$\left\{\frac{8\, d\, \delta\, (N-1)}{9\, N\, v},\ N = 4,\ v = \frac{8}{9},\ d = 0.9,\ \delta = 0.99\right\}$$

Substitution:

$$\frac{8\, d\, \delta\, (N-1)}{9\, N\, v} \approx 0.66825$$