Physical Constants

Acceleration of gravity at sea level and equator	g=9.80665 m s^{-2}
Atomic mass unit	1 amu = 1.660566×10^{-24} g = $(6.022045 \times 10^{23})^{-1}$ g
Avogadro's number	$N = 6.022045 \times 10^{23}$ $mole^{-1}$
Boltzmann's Constant	$k = 1.38066 \times 10^{-23}$J K^{-1}
Electron charge	$e = 1.602189 \times 10^{-19}$ C
Faraday's constant	$F = 96{,}484.6$ C $mole^{-1}$
Gas constant	$R = 8.31441$ J K^{-1} $mole^{-1}$
	$R = 0.08314$ L bar K^{-1} $mole^{-1}$
	$R = 0.082057$ L atm K^{-1} $mole^{-1}$
Planck's constant	$h = 6.626176 \times 10^{-34}$ J s
	$\frac{h}{2\pi} = \hbar = 1.054589 \times 10^{-34}$ J s
Permittivity of a vacuum	$\epsilon_0 = 8.8542 \times 10^{-12}$ F m^{-1}
Speed of light	$c = 2.9979246 \times 10^{8}$ m s^{-1}

Conversion Factors

1 atm = 101.3 kPa = 1.01325 bar = 760 mm Hg = 760 torr
0°C = 273.16 K
1 electron volt (eV) = 1.602189×10^{-19} J
1 calorie = 4.184 J
1 liter atm = 101.325 J
1 kJ $mole^{-1}$ = 83.593 cm^{-1} (from $E = hc\bar{\nu}$)

SI Scale Prefixes

Tera(T)	10^{12}	Kilo (k)	10^{3}	Milli (m)	10^{-3}
Giga(G)	10^{9}	Deci (d)	10^{-1}	Micro (μ)	10^{-6}
Mega(M)	10^{6}	Centi (c)	10^{-2}	Nano (n)	10^{-9}
				Pico (p)	10^{-12}

Fundamental Units

1 joule = 1 J = 1 m^2 kg s^{-2}
1 newton = 1 N = 1 m kg s^{-2}
1 pascal = 1 Pa = 1 N m^{-2} = 1 J m^{-3} = 1 kg m^{-1} s^{-2}
1 watt = 1 W = 1 J s^{-1} = 1 m^2 kg s^{-3}
1 volt = 1 V = 1 J C^{-1}
1 Farad = 1 C^2 N^{-1} m^{-1}

Definite Integrals

$$\int_0^\infty \exp(-\alpha x^2)dx = \frac{1}{2}\left(\frac{\pi}{\alpha}\right)^{1/2} \qquad \int_0^\infty x\exp(-\alpha x^2)dx = \frac{1}{2\alpha}$$

$$\int_0^\infty x^2\exp(-\alpha x^2)dx = \frac{1}{4}\left(\frac{\pi}{\alpha^3}\right)^{1/2} \qquad \int_0^\infty x^3\exp(-\alpha x^2)dx = \frac{1}{2\alpha^2}$$

$$\int_0^\infty x^4\exp(-\alpha x^2)dx = \frac{3}{8}\left(\frac{\pi}{\alpha^5}\right)^{1/2} \qquad \int_0^\infty x^5\exp(-\alpha x^2)dx = \frac{1}{\alpha^3}$$

$$\int_0^\infty x^{2n}\exp(-\alpha x^2)dx = \frac{1\cdot 3\cdot 5...(2n-1)}{2^{2n+1}}\left(\frac{\pi}{\alpha^{2n+1}}\right)^{1/2} \qquad \int_0^\infty x^{2n+1}\exp(-\alpha x^2)dx = \frac{n!}{2\alpha^{n+1}}$$

Maxima and Minima of f(x)

At a minimum of f(x), the first derivative is zero and the second derivative is positive.
At a maximum of f(x), the first derivative is zero and the second derivative is negative.
At an inflection point of f(x), both first and second derivatives are zero.