

## errors

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```
In [35]: import pyperclip
         from sympy import *
         init_printing()
         def errors(fx, *parameters):
             eq = 0
             for parameter, error in parameters:
                 eq += diff(fx, parameter) **2 * error**2
             pyperclip.copy(latex(sqrt(eq)))
             return sqrt(eq)
         def delta(name):
             return var("\Delta\ %s"%(name,))
         d = delta
         def set_global_vars(txt):
             variables = txt.split()
             for v in variables:
                 if v.startswith('\'):
                     globals()[v[1:]] = var(v)
                     globals()['d'+v[1:]] = d(v)
                 else:
                     globals()[v] = var(v)
                     globals()['d'+v] = d(v)
```

```
In [26]: #Example 1
         C = 0.000000001
         dC = 0.00000000005
         R = 1470
         dR = 0.5
         Omega = 1.185e5
         dOmega = .0005e5
```

```
In [73]: fx = c*r*omega; fx
```

Out[73]:

$$\omega cr$$

```
In [74]: errs = errors(fx, (omega, domega), (r,dr), (c,dc)); errs
```

Out [74]:

$$\sqrt{\Delta\omega^2c^2r^2 + \Delta c^2\omega^2r^2 + \Delta r^2\omega^2c^2}$$

```
In [32]: #Calculate Value
fx.subs({omega : Omega, r : R, c:C })
```

Out [32]:

0.174195

```
In [33]: #Calculate Error
errs.subs({omega : Omega, domega : dOmega, r : R, c:C, dr : dR, dc : dC})
```

Out [33]:

0.00871026164216667

```
In [60]: #Example 2
set_global_vars('a1 a2')
A1 = 1.754
dA1 = (1.751- 1.757)/3.92
A2 = 10.41
dA2 = (10.4-10.41)/3.92
```

```
In [70]: fx2 = a1/a2; fx2
```

Out [70]:

$$\frac{a_1}{a_2}$$

```
In [71]: err2= errors(fx2, (a1, da1), (a2,da2)); err2
```

Out [71]:

$$\sqrt{\frac{\Delta a_1^2}{a_2^2} + \frac{\Delta a_2^2}{a_2^4} a_1^2}$$

```
In [62]: #Calculate Value
fx2.subs({a1 : A1, da1 : dA1, a2 : A2, da2 : dA2})
```

Out [62]:

0.168491834774256

```
In [72]: #Calculate Error
err2.subs({a1 : A1, da1 : dA1, a2 : A2, da2 : dA2, })
```

Out [72]:

0.000152720361273809

In [ ]: