six

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1 Get Six

[4]:
```
from IPython.display import display, Math, Latex

from operator import add, sub, mul
import itertools
from functools import partial
import math


N_MAX = 10
DISPLAY_LATEX = True
latex = {}


# binary operators
ops2 = [add, sub, mul]

def divide(x,y):
    return x/y

latex["add"] = "+"
latex["sub"] = "-"
latex["mul"] = "*"
latex["divide"] = "/"

ops2.append(divide)

# unary operators
ops1 = [ ]

def id(x):
    return x

latex[id.__name__] = ""

def logn(x, *, base):
```

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    return math.log(x, base)


ops1.append(id)


for n in range(2, 100):
    f = partial(pow, exp=n)
    f.__name__ = f"pow{n}"
    latex[f.__name__] = f"\\pow^{{{n}}}"
    ops1.append(f)

    g = partial(pow, exp=1./n)
    g.__name__ = f"sqrt[{n}]"
    latex[g.__name__] = f"\\sqrt[{n}]"
    ops1.append(g)

    h = partial(logn, base=n)
    h.__name__ = f"log_{n}"
    latex[h.__name__] = f"\\log_{{{n}}}"
    ops1.append(h)


for n in range(1, N_MAX):
    for op1, op2, f in itertools.product(ops2, ops2, ops1):
        try:
            m = f(n)
            res = op1(m, op2(m, m))
            if abs(res-6)<1E-6:

                if DISPLAY_LATEX:
                    expr1 = f"{latex[f.__name__]}{n}"
                    expr = f"{expr1}{latex[op1.__name__]}({expr1}{latex[op2.
 ↪__name__]}{expr1}) = 6 \\\\"
                    display(Math(expr))
                else:
                    print(f"{n:2d}:  {f.__name__}({n}) -> {op1.__name__}({m},␣
 ↪{op2.__name__}({m}, {m})) = {res}")
        except ZeroDivisionError:
            pass
```

$2 + (2 + 2) = 6$

$2 + (2 * 2) = 6$

$\log_{64} 2/(\log_{64} 2 * \log_{64} 2) = 6$

$\sqrt[2]{3} * (\sqrt[2]{3} + \sqrt[2]{3}) = 6$

$\sqrt[2]{4} + (\sqrt[2]{4} + \sqrt[2]{4}) = 6$

$\log_2 4 + (\log_2 4 + \log_2 4) = 6$

$\sqrt[2]{4} + (\sqrt[2]{4} * \sqrt[2]{4}) = 6$

$\log_2 4 + (\log_2 4 * \log_2 4) = 6$

$5 + (5/5) = 6$

$6 + (6 - 6) = 6$

$6 - (6 - 6) = 6$

$\sqrt[3]{6} * (\sqrt[3]{6} * \sqrt[3]{6}) = 6$

$6 * (6/6) = 6$

$6/(6/6) = 6$

$7 - (7/7) = 6$

$\sqrt[3]{8} + (\sqrt[3]{8} + \sqrt[3]{8}) = 6$

$\sqrt[3]{8} + (\sqrt[3]{8} * \sqrt[3]{8}) = 6$

$\log_3 9 + (\log_3 9 + \log_3 9) = 6$

$\log_3 9 + (\log_3 9 * \log_3 9) = 6$

$\sqrt[4]{9} * (\sqrt[4]{9} + \sqrt[4]{9}) = 6$

For 100 it looks like

$2+(2+2) = 62+(2*2) = 6\log_{64} 2/(\log_{64} 2*\log_{64} 2) = 6\sqrt[2]{3}*(\sqrt[2]{3}+\sqrt[2]{3}) = 6\sqrt[2]{4}+(\sqrt[2]{4}+\sqrt[2]{4}) = 6\log_2 4+(\log_2 4+\log_2 4)$

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