

## UTS Robotics and Intelligent System

- Nama : Brilliant Friezka Aina
- NIM : 1103194186
- Kelas : TK-43-GAB

```
pip install symforce
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting symforce
  Downloading symforce-0.7.0-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (4.4 MB)
    |████████████████████████████████████████| 4.4 MB 21.2 MB/s
Collecting sympy<=1.11.1
  Downloading sympy-1.11.1-py3-none-any.whl (6.5 MB)
    |████████████████████████████████████████| 6.5 MB 45.2 MB/s
Collecting clang-format
  Downloading clang_format-15.0.4-py2.py3-none-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (1.5 MB)
    |████████████████████████████████████████| 1.5 MB 42.4 MB/s
Requirement already satisfied: graphviz in /usr/local/lib/python3.8/dist-packages (from symforce) (0.10.1)
Requirement already satisfied: scipy in /usr/local/lib/python3.8/dist-packages (from symforce) (1.7.3)
Collecting black
  Downloading black-22.10.0-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (1.5 MB)
    |████████████████████████████████████████| 1.5 MB 48.4 MB/s
Collecting symforce-sym==0.7.0
  Downloading symforce_sym-0.7.0-py3-none-any.whl (70 kB)
    |████████████████████████████████████████| 70 kB 4.8 MB/s
Requirement already satisfied: Jinja2 in /usr/local/lib/python3.8/dist-packages (from symforce) (2.11.3)
Collecting skymarshal==0.7.0
  Downloading skymarshal-0.7.0-py3-none-any.whl (82 kB)
    |████████████████████████████████████████| 82 kB 361 kB/s
Requirement already satisfied: numpy in /usr/local/lib/python3.8/dist-packages (from symforce) (1.21.6)
Collecting ply
  Downloading ply-3.11-py2.py3-none-any.whl (49 kB)
    |████████████████████████████████████████| 49 kB 3.8 MB/s
Requirement already satisfied: six in /usr/local/lib/python3.8/dist-packages (from skymarshal==0.7.0->symforce) (1.15.0)
Collecting argh
  Downloading argh-0.26.2-py2.py3-none-any.whl (30 kB)
Requirement already satisfied: mpmath>=0.19 in /usr/local/lib/python3.8/dist-packages (from sympy<=1.11.1->symforce) (1.2.1)
Collecting click>=8.0.0
  Downloading click-8.1.3-py3-none-any.whl (96 kB)
    |████████████████████████████████████████| 96 kB 3.1 MB/s
Requirement already satisfied: typing-extensions>=3.10.0.0 in /usr/local/lib/python3.8/dist-packages (from black->symforce) (4.1.1)
Requirement already satisfied: tomli>=1.1.0 in /usr/local/lib/python3.8/dist-packages (from black->symforce) (2.0.1)
Collecting mypy_extensions>=0.4.3
  Downloading mypy_extensions-0.4.3-py2.py3-none-any.whl (4.5 kB)
Collecting pathspec>=0.9.0
  Downloading pathspec-0.10.2-py3-none-any.whl (28 kB)
Collecting platformdirs>=2
  Downloading platformdirs-2.5.4-py3-none-any.whl (14 kB)
Requirement already satisfied: MarkupSafe>=0.23 in /usr/local/lib/python3.8/dist-packages (from Jinja2->symforce) (2.0.1)
Installing collected packages: ply, platformdirs, pathspec, mypy_extensions, click, argh, sympy, symforce-sym, skymarshal, clang-format,
  Attempting uninstall: click
    Found existing installation: click 7.1.2
    Uninstalling click-7.1.2:
      Successfully uninstalled click-7.1.2
  Attempting uninstall: sympy
    Found existing installation: sympy 1.7.1
    Uninstalling sympy-1.7.1:
      Successfully uninstalled sympy-1.7.1
ERROR: pip's dependency resolver does not currently take into account all the packages that are installed. This behaviour is the source
flask 1.1.4 requires click<8.0,>=5.1, but you have click 8.1.3 which is incompatible.
Successfully installed argh-0.26.2 black-22.10.0 clang-format-15.0.4 click-8.1.3 mypy_extensions-0.4.3 pathspec-0.10.2 platformdirs-2.5.
```

```
import symforce
```

```
symforce.set_symbolic_api("sympy")
symforce.set_log_level("warning")
```

```
from symforce.notebook_util import display, print_expression_tree
```

```
import symforce.symbolic as sf
```

```
x = sf.Symbol("x")
y = sf.Symbol("y")
```

```
expr = x ** 2 + sf.sin(y) / x ** 2
display(expr)
```

$$x^2 + \frac{\sin(y)}{x^2}$$

```
print_expression_tree(expr)
```

```
Add: x**2 + sin(y)/x**2
+-Pow: x**2
| +-Symbol: x
| +-Integer: 2
+-Mul: sin(y)/x**2
+-Pow: x**(-2)
| +-Symbol: x
| +-Integer: -2
+-sin: sin(y)
+-Symbol: y
```

```
display(expr.subs({x: 1.2, y: 0.4}))
```

1.71042940438101

```
display(expr.diff(y))
```

$$\frac{\cos(y)}{x^2}$$

```
display(sf.series(expr, y))
```

$$\frac{y}{x^2} - \frac{y^3}{6x^2} + \frac{y^5}{120x^2} + x^2 + O(y^6)$$

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