VScode interactive session with *align* environment

VScode interactive session

While developing a quarto document with vscode, it's possible to run code cell into interactive session (`run cell`)

```
print('hello world')
```

```
hello world
```

Using `sympy` I can generate valid markdown mathematical expression that are also valid code:

```
from IPython.display import Markdown, display
from sympy import latex, Eq, symbols

# define function that will generate valid markdown to be interpreted by quarto a display

def show(expr, label='default', **kwargs):
    if not 'mul_symbol' in kwargs:
        kwargs['mul_symbol'] = '\,'
    return display(Markdown(
fr"""
$$
    {latex(expr, **kwargs)}
$${{#eq-{label}}}
"""))
```

The above code let me generate expression that look nice in a pdf.

- here a single equation, which is referenceable (see Equation 1)

```
x, y = symbols('x y')

show(Eq(x,y), label='1')
```

$$x = y \tag{1}$$

- If I generate a few equation in a row, there is kind of a lot a white space between the rendered equations:

```
a, b, c, d = symbols('a b c d')

show(Eq(x+1,y), label='2')
show(Eq(a,b), label='3')
show(Eq(c,d), label='4')
```

$$x + 1 = y \tag{2}$$

$$a = b \tag{3}$$

$$c = d \tag{4}$$

It would be nice then to be able to use the environment from the `ams` latex package such as `gather` or `align`[1]; I define then a new function:

```
def show_dict(eqn_dict, comment_label=False, environment='align', debug=False, **kwargs):
    if not 'mul_symbol' in kwargs:
        kwargs['mul_symbol'] = '\,'

    template = f"\\begin{{{environment}}}\n$body$\n\\end{{{environment}}}"

    eqn_list = []
    for l, e in eqn_dict.items():
        label = ('%' if comment_label else '') + f"\label{{eq-{l}}}"
        eqn_list.append(fr"{latex(e, **kwargs)} {label}")

    body = '\n\\\\'.join(eqn_list)
```

[1] I can align expression this way

```
    body = body.replace("=", "&=")
    template = template.replace('$body$', body)

    if debug:
        print(template)

    return display(Markdown(template))
```

- the same equation as above appear as follows:

```
eqs = {
    5: Eq(x+1, y),
    6: Eq(a, b),
    7: Eq(c, d),
}

show_dict(eqs)
```

$$x + 1 = y \tag{5}$$
$$a = b \tag{6}$$
$$c = d \tag{7}$$

The equations are more compact and nicely align at the = sign. They are also referenceable, albeit I have to use latex syntax:

- `\ref{eq-5}` →5
- `\eqref{eq-6}` →(6)
- `@eq-7` →**?@eq-7** (quarto citation style does not work with `\label` environment)

If I render the same code passing the flag `comment_label = True`, then the rendered equation are still numbererd in the pdf, but they are not referenceable:

```
# label updated to be unique
eqs = {
    8: Eq(x+1, y),
    9: Eq(a, b),
    10: Eq(c, d),
}

show_dict(eqs, comment_label=True)
```

$$x + 1 = y \tag{8}$$

$$a = b \tag{9}$$

$$c = d \tag{10}$$

- `\ref{eq-8}` →**??**
- `\eqref{eq-9}` →(**??**)
- `@eq-10` →**?@eq-10** (quarto citation style *still* does not work with `\label` environment)