Packages PY

1) What is a Python package? How is it different from a module?

A Python package is a folder containing multiple modules and an __init__.py file.
A module is a single .py file.
Difference:

- Module = single file
- Package = collection of related modules in a folder.

2) What is the purpose of __init__.py in a package directory?

The __init__.py file tells Python that the directory should be treated as a package.
It can also run initialization code or define the __all__ list to control what gets imported with *.

3) What happens when you use from package import * in Python?

Python will import only the names defined in the package's __init__.py under __all__.
If __all__ is not defined, nothing is imported unless done explicitly.

4) What is the effect of defining __all__ in a package's __init__.py file?

__all__ is a list of modules or names to be imported when using from package import *.
It controls which modules/functions get exposed.

Example:

__all__ = ['basic_ops'].

5) How can you create and use a subpackage in Python?

- Create a folder (subpackage) inside your main package.
- Add an __init__.py in both the main and subpackage folders.
- Add modules inside the subpackage.
- Import using:
  from main_package.subpackage.module import function

6) Create a package math_utils with modules:

Structure:

```
math_utils/
├── __init__.py
├── basic_ops.py
└── advanced_ops.py
```

basic_ops.py

```
def add(a, b):
    return a + b
def subtract(a, b):
    return a - b
```

advanced_ops.py

```
def power(a, b):
    return a ** b
def factorial(n):
    if n == 0:
        return 1
    return n * factorial(n - 1)
```

__init__.py

```
__all__ = ['basic_ops', 'advanced_ops']
```

Usage:

```
from math_utils import basic_ops, advanced_ops

print(basic_ops.add(2, 3))

print(advanced_ops.power(2, 4))
```

7) Intra-package references example

Structure:

```
mypackage/

├── __init__.py

├── module_a.py

└── module_b.py
```

module_b.py

```
def say_hello():

    return "Hello from module B"
```

module_a.py

python

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```
from .module_b import say_hello

def greet():

    return say_hello()
```

8) Package shapes with subpackage area

Structure:

```
shapes/
└── area/
    ├── __init__.py
    ├── circle.py
    └── rectangle.py
```

circle.py

```
def area_of_circle(r):
    return 3.14 * r * r
```

rectangle.py

```
from .circle import area_of_circle  # relative import
def print_circle_area(r):
    print("Area of Circle:", area_of_circle(r))
```

9) Modify math_utils/__init__.py with:

```
__all__ = ['basic_ops']
```