Python Best Practices Cheat Sheet

1. Docstrings

Use triple quotes to explain what a function, class, or script does.

Example:
```
def scan_ports(ip):
    """Scan all TCP ports on a given IP and return open ports."""
```

2. Meaningful Names

Avoid vague names like x, y, data. Be descriptive.

Example:
```
def get_user_credentials():
    ...
```

3. Comments

Explain *why* something is done, not what is obviously being done.

```
# Retry the request if it times out
response = send_request(retry=True)
```

4. Formatting

Follow PEP 8: 4 spaces for indent, under 79 characters per line.
Use tools like Black or autopep8.

5. Constants

Use ALL_CAPS for values that shouldn’t change.

```
MAX_ATTEMPTS = 5
```

6. Avoid Magic Numbers

Give important numbers a name so the code is readable.

```
DEFAULT_TIMEOUT = 10
```

7. List Comprehensions

Compact loops for list creation.

```
ports = [p for p in range(1024) if is_open(p)]
```

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8. Use `with` for File Access

Automatically closes the file.

```
with open("log.txt") as f:
    data = f.read()
```

9. Try/Except for Error Handling

Handle errors without crashing the script.

```
try:
    connect_to_db()
except ConnectionError:
    print("DB unreachable.")
```

10. `if __name__ == '__main__'`

Keeps your script modular.

```
def main():
    run_scan()

if __name__ == "__main__":
    main()
```

Security-Focused Examples

Avoid hardcoding sensitive info:
API_KEY = "1234abcd"
Use environment variables or config files.

Validate input before using:
```
def is_valid_ip(ip):
    return re.match(r"^\d{1,3}(\.\d{1,3}){3}$", ip)
```

Use parameterized queries to avoid SQL injection:
```
cursor.execute("SELECT * FROM users WHERE username = ?", (username,))
```

Log errors, don’t print sensitive info:
```
except Exception as e:
    logging.error("Unexpected error", exc_info=True)
```

Bonus Tips

- Keep functions short and focused
- Avoid globals when possible
- Test your code in small chunks

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- Use version control (Git) even for scripts