Code Quality

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Readability

Coding Standards

Tools (pep8, pylint)

Cyclomatic Complexity (mccabe)

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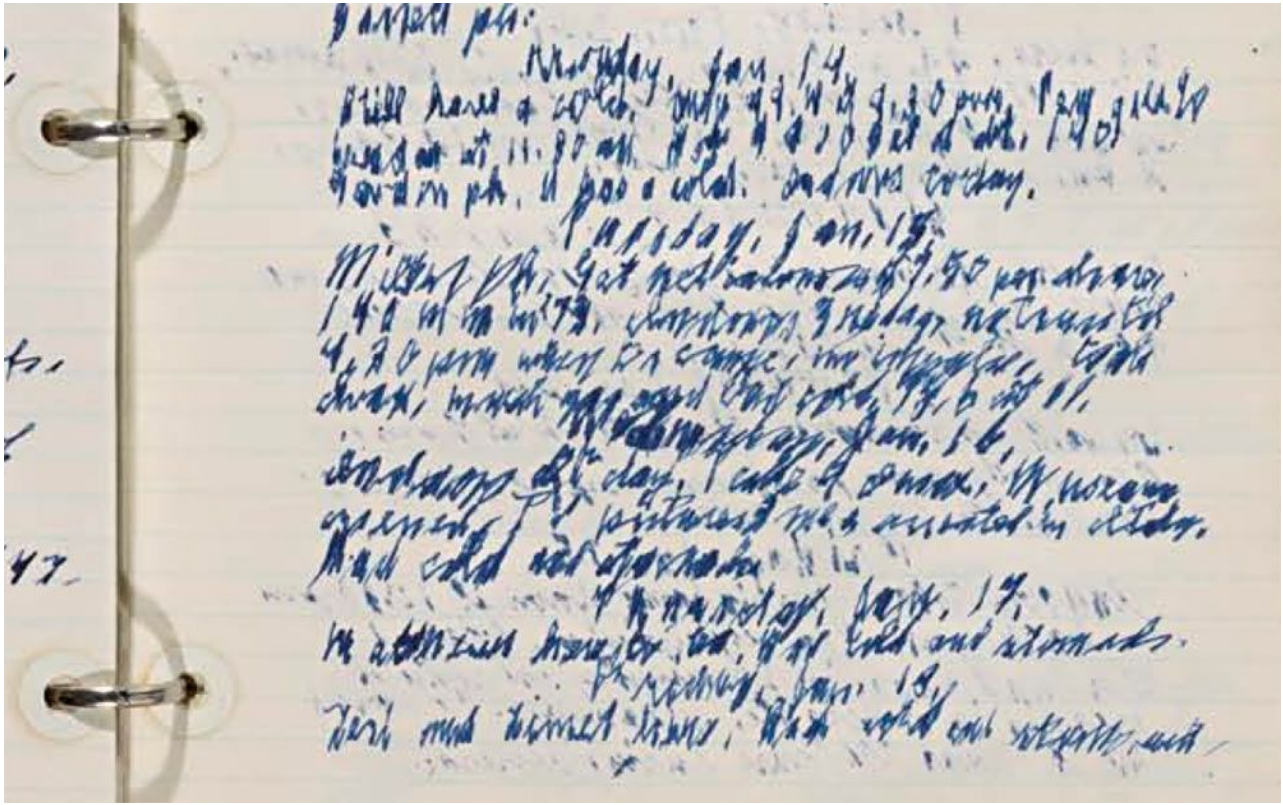

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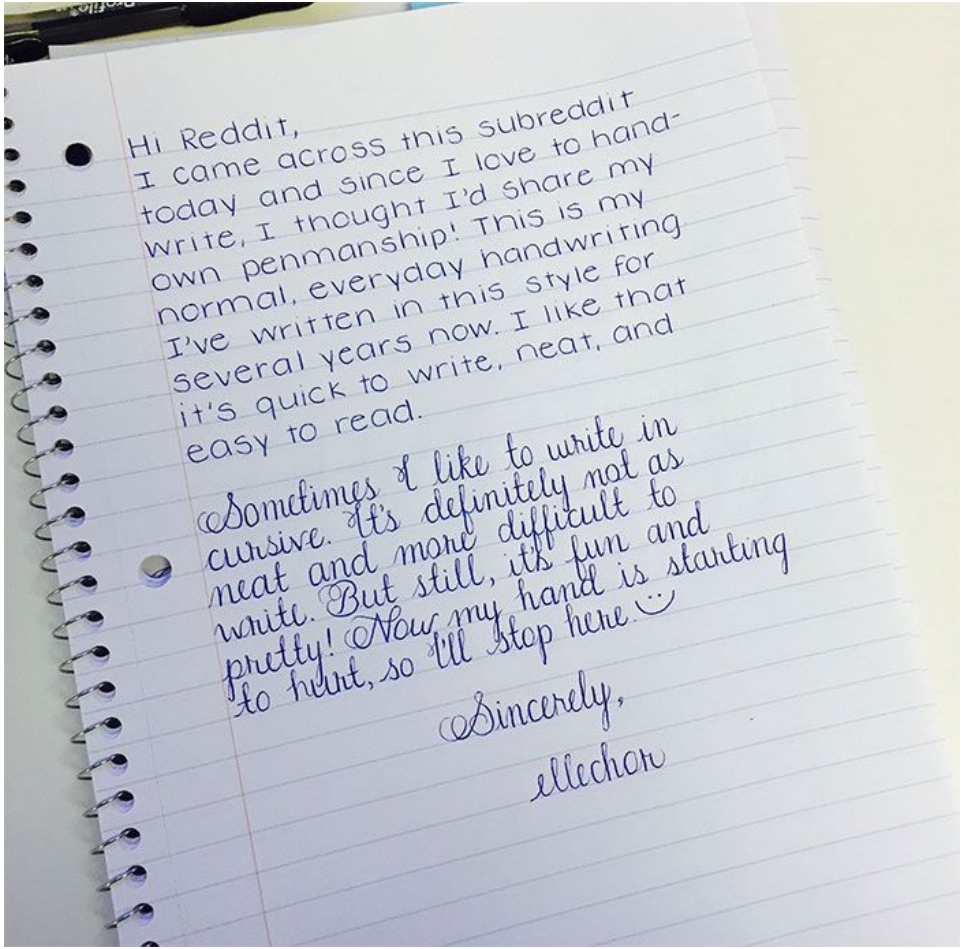

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What about code?

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How to write good code?

1. Follow common conventions
2. Break down into modular parts
3. Test it (next section)

PEP8: Python Style Guide (bad)

```
i= 2

data=(42,55, 10, 13)

result = 20+ data[i]
```

PEP8: Python Style Guide (bad)

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i= 2

data=(42,55, 10, 13)

result = 20+ data[i]
```

code-style-demo/bad_pep8.py

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PEP8: Python Style Guide (good)

```
i = 2

data = (42, 55, 10, 13)

result = 20 + data[i]
```

Pylint: Python code smells (bad)

```
def find_reconciled(transactions, receipts):
    r = []
    if len(transactions) > 0:
        for t in transactions:
            r.append(t)
    return r
```

code-style-demo/bad_pylint.py

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Pylint: Python code smells (bad)

```
def find_reconciled(transactions, receipts):
    r = []
    if len(transactions) > 0:
        for t in transactions:
            r.append(t)
    return r
```

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Pylint: Python code smells (good)

```
def find_reconciled(transactions, receipts):
    """
    :param transactions: a list of transactions objects
    :param receipts: a dictionary of unique transaction id to receipt objects
    :return: a list of transactions that have an associated receipt
    """
    result = []
    for transaction in transactions:
        if transaction.id in receipts:
            result.append(transaction)
    return result
```

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McCabe: Cyclomatic Complexity (bad)

```
def process(data):
    output = ""
    for i in range(1, 10):
        for j in range(1, 10):
            if i != j:
                for a in range(1, 10):
                    for b in range(1, 10):
                        if a == i and j == b:
                            output += data[i]
    return output
```

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McCabe: Cyclomatic Complexity

- Outputs a software metric that gives an indication of the code “difficulty” (the smaller the better)
- Roughly based on number of conditionals and nested blocks in one function
- Suggests that a particular function should be further modularised to make it easier to reason about
- **Not to be confused *algorithmic complexity*!**

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McCabe: Cyclomatic Complexity (good)

```
def process(data):
    output = ""
    for i in range(1, 10):
        for j in range(1, 10):
            if i == j:
                output += _sub_process(data, i, j)
    return output
```

```
def _sub_process(data, i, j):
    for a in range(1, 10):
        for b in range(1, 10):
            if a == i and j == b:
                return data[i]
```

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Tools

```
pip install pycodestyle autopep8 pylint mccabe
```

`pycodestyle`: highlights pep8 conflicts

`autopep8`: automatically fixes pep8 problems

`pylint`: checks coding standards and potential errors

`mccabe`: reports cyclomatic complexity

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Exercise (10 min)

Simplify and refactor the code to clean up code warnings

```
$ pycodestyle --show-source --show-pep8 sad_code.py
```

```
$ pylint sad_code.py
```

```
$ python -m mccabe sad_code.py
```

Takeaways

- Readable code helps maintainability and reduce scope for bugs
- PEP8 checks for code conventions
- Pylint checks for code smells and potential bugs
- Cyclomatic Complexity (mccabe) is a software metric that tells you whether you should further modularise your code to ease comprehension
- Code checking tools can be quite verbose, it doesn't mean your code is necessarily bad!

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