

chapter1

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2019011265 93

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[ ]: import numpy as np
import matplotlib.pyplot as plt
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[ ]: M = 1
eps = 1e-16
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[ ]: def truncation_err(h):
    return M * h / 2

def round_err(h):
    return 2 * eps / h

def total_err(h):
    return truncation_err(h) + round_err(h)

def actual_err(h):
    return np.abs((np.sin(1 + h) - np.sin(1) / h) - np.cos(1))
```

```
[ ]: x = [10 ** i for i in range(-16, 1)]

truc_err = [truncation_err(h) for h in x]
rd_err = [round_err(h) for h in x]
tot_err = [total_err(h) for h in x]
act_err = [actual_err(h) for h in x]
```

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[ ]: plt.p
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[ ]:
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