

Chapter 1



```
File Edit View Search Terminal Help
>>> import scipy
>>> scipy.test()
Running unit tests for scipy
NumPy version 1.8.0
NumPy is installed in /opt/python2.76/site-packages/numpy
SciPy version 0.13.3
SciPy is installed in /opt/python2.76/site-packages/scipy
Python version 2.7.6 [GCC 4.1.2 20080704 (Red Hat 4.1.2-54)]
nose version 1.3.0
...
...
-----
Ran 8936 tests in 194.730s

OK (KNOWNFAIL=115, SKIP=204)
<nose.result.TextTestResult run=8936 errors=0 failures=0>
>>>
```

```
File Edit View Search Terminal Help
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```
>>> import scipy
>>> scipy.test()
Running unit tests for scipy
NumPy version 1.9.0
NumPy is installed in /opt/python3.41/site-packages/numpy
SciPy version 0.14.0
SciPy is installed in /opt/python3.41/site-packages/scipy
Python version 3.4.1 [GCC 4.4.7 20120313 (Red Hat 4.4.7-1)]
nose version 1.3.4
...
...
...
-----
Ran 16413 tests in 363.062s

FAILED (KNOWNFAIL=277, SKIP=904, errors=326, failures=45)
<nose.result.TextTestResult run=16413 errors=326 failures=45>
>>>
```

```
Help on function bayes_mvs in module scipy.stats.morestats:
```

```
bayes_mvs(data, alpha=0.90000000000000002)
```

```
Return Bayesian confidence intervals for the mean, var, and std.
```

```
Assumes 1-d data all has same mean and variance and uses Jeffrey's prior
for variance and std.
```

```
alpha gives the probability that the returned confidence interval contains
the true parameter.
```

```
Uses mean of conditional pdf as center estimate
(but centers confidence interval on the median)
```

```
Returns (center, (a, b)) for each of mean, variance and standard deviation.
Requires 2 or more data-points.
```

```
{END}
```

Help on package scipy.stats in scipy:

NAME

scipy.stats

FILE

/Applications/sage/local/lib/python2.6/site-packages/scipy/stats/__init__.py

DESCRIPTION

Statistical Functions
=====

This module contains a large number of probability distributions as well as a growing library of statistical functions.

Each included distribution is an instance of the class `rv_continuous`. For each given name the following methods are available. See docstring for `rv_continuous` for more information

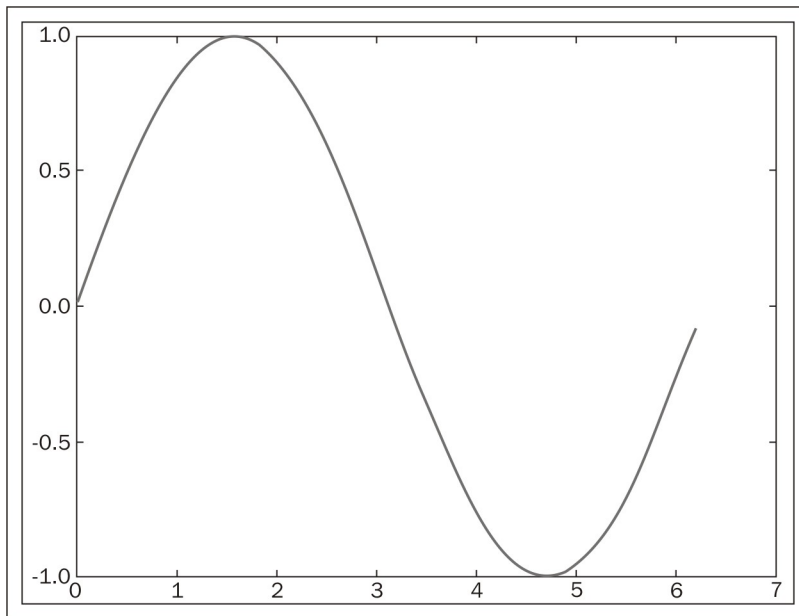
```
:rvs:
    random variates with the distribution
:pdf:
    probability density function
:cdf:
    cumulative distribution function
:sf:
    survival function (1.0 - cdf)
:ppf:
    percent-point function (inverse of cdf)
:isf:
    inverse survival function
:stats:
    mean, variance, and optionally skew and kurtosis
```

Calling the instance as a function returns a frozen pdf whose shape, location, and scale parameters are fixed.

Distributions

The distributions available with the above methods are:





Chapter 2



Alonso Quijano, the protagonist of the novel, is a retired country gentleman nearing fifty years of age, living in an unnamed section of La Mancha with his niece and housekeeper. While mostly a rational man of sound reason, his reading of books of chivalry in excess has had a profound effect on him, leading to the distortion of his perception and the wavering of his mental faculties. In essence, he believes every word of these books of chivalry to be true though, for the most part, the content of these books is clearly fiction. Otherwise, his wits, in regards to everything other than chivalry, are intact. He decides to out as a knight-errant in search of adventure. He dons an old suit of armour, renames himself "Don Quixote de la Mancha," and names his skinny horse "Rocinante". He designates a neighboring farm girl as his lady love, renaming her Dulcinea del Toboso, while she knows nothing about this.

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Chapter 3

$$\begin{pmatrix} 0 & 10 & 0 & 0 & 0 \\ 0 & 0 & 20 & 0 & 0 \\ 0 & 0 & 0 & 30 & 0 \\ 0 & 0 & 0 & 0 & 40 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \cdot \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} = \begin{pmatrix} 7 & 10 \\ 15 & 22 \end{pmatrix}$$

$$v_1 = \frac{1}{\sqrt{2}}(1, 0, 1),$$

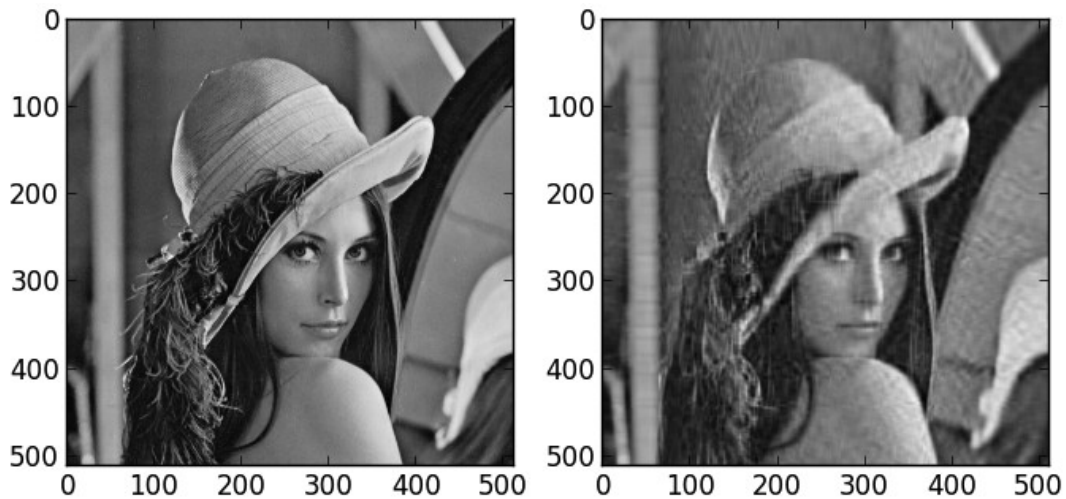
$$v_2 = (0, 1, 0),$$

$$v_3 = \frac{1}{\sqrt{2}}(1, 0, -1)$$

$$e^A = \sum_{n=0}^{\infty} \frac{1}{n!} A^n$$

$$A = U \cdot S \cdot V^*, U = \begin{pmatrix} u_1 \\ \vdots \\ u_n \end{pmatrix}, S = \begin{pmatrix} s_1 & & \\ & \ddots & \\ & & s_n \end{pmatrix}, V^* = (v_1 \quad \dots \quad v_n)$$

$$\sum_{j=1}^k s_j (u_j \cdot v_j)$$



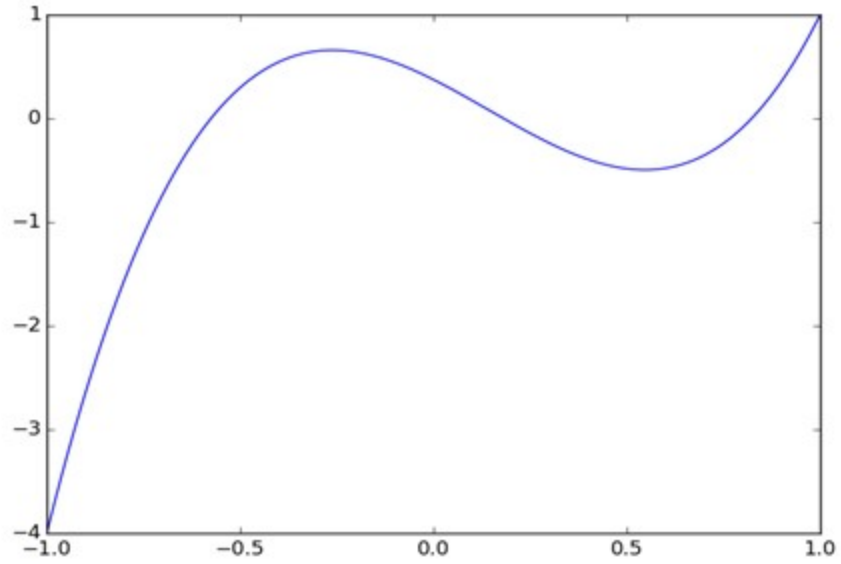
$$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix} \cdot \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$$

Chapter 4

$$f(x, y) = (1 - x^2) + 100(y - x^2)^2$$

$$\ln(1 + x) \approx x - \frac{x^2}{2} \quad \text{if } x \rightarrow 0$$

$$\frac{x^2 + 1}{2x + 1} = \underbrace{\left(\frac{1}{2}x - \frac{1}{4} \right)}_{\text{quotient}} + \frac{\overbrace{5/4}^{\text{remainder}}}{2x + 1}$$



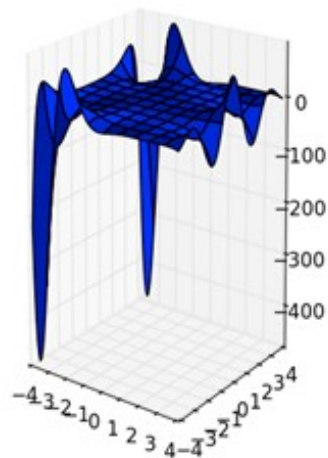
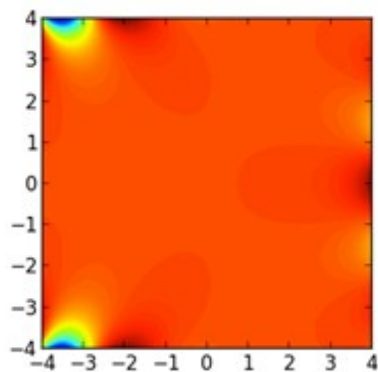
$$\Gamma(z) = \int_0^{\infty} e^{-t} t^{z-1} dt$$

$$\ln(a!/b!) \simeq 10^{10} \psi(a)$$

$$\zeta(p) = \sum_{n=1}^{\infty} \frac{1}{n^p}$$

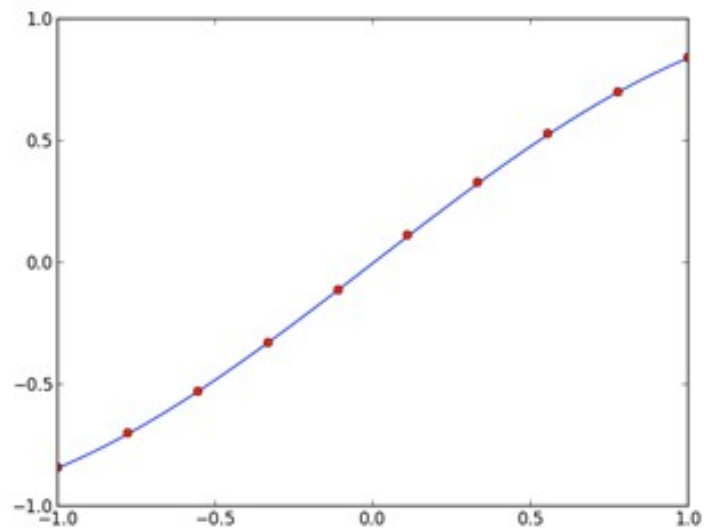
$$\text{zeta}(a, p) = \sum_{n=0}^{\infty} \frac{1}{(n+a)^p}$$

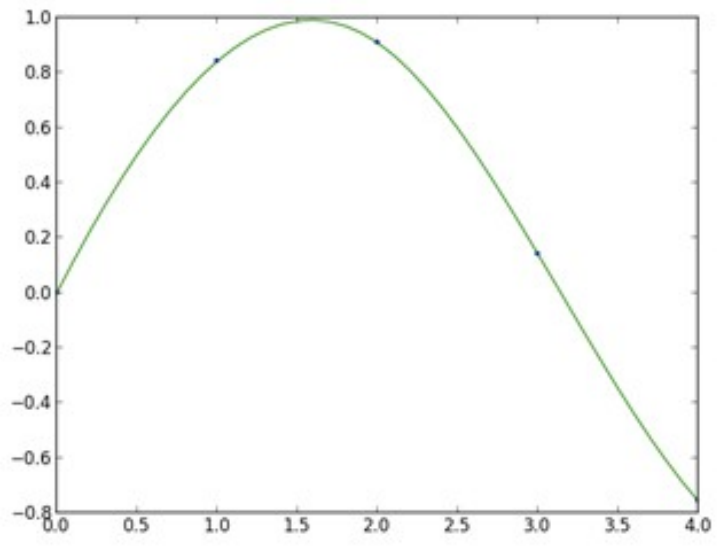
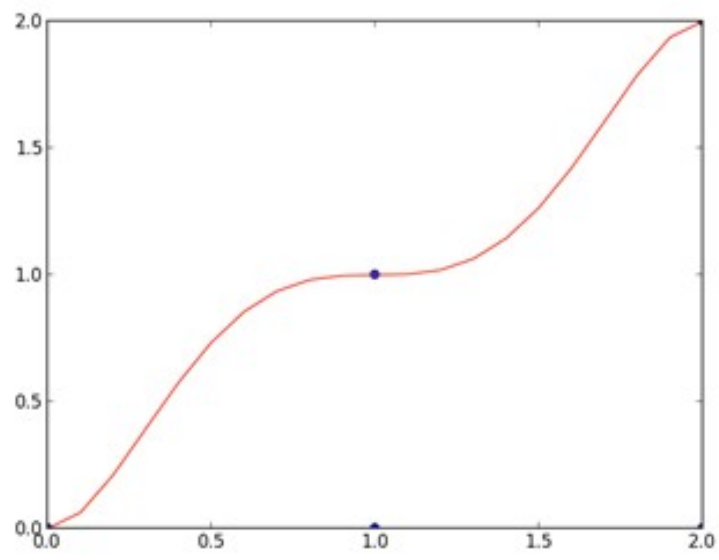
$$y'' = xy$$

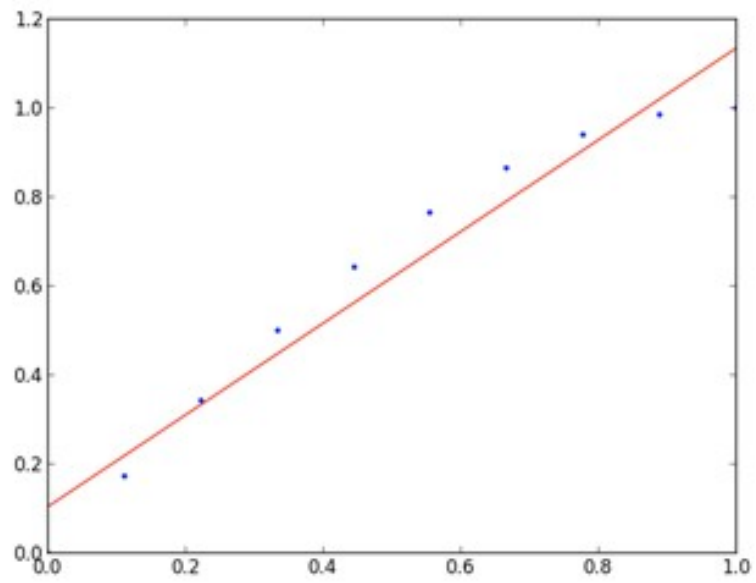
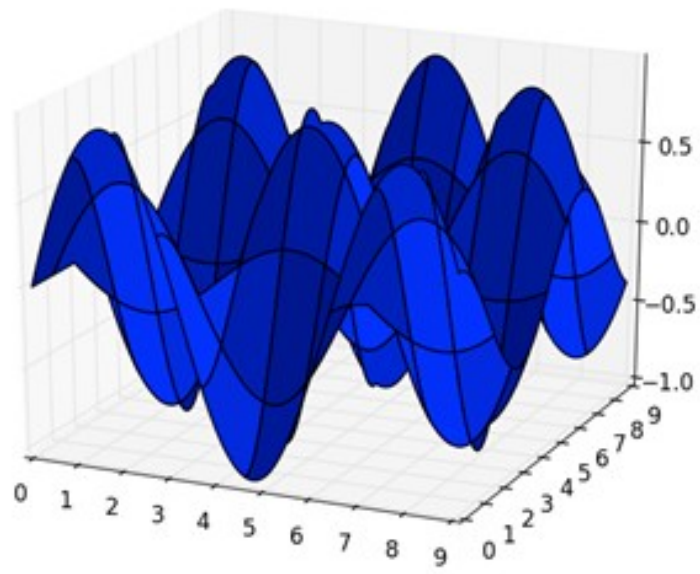


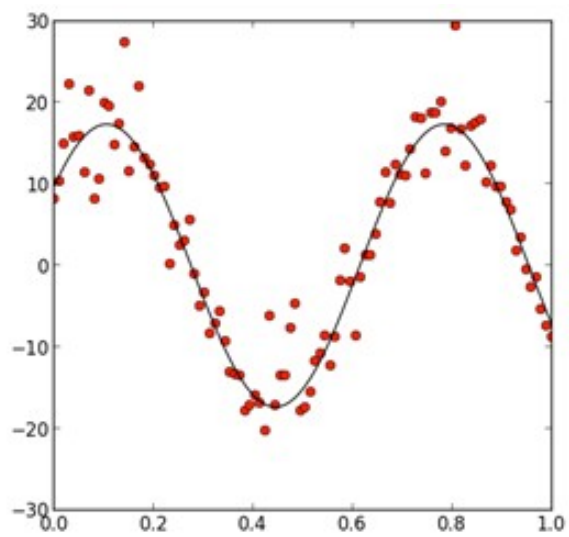
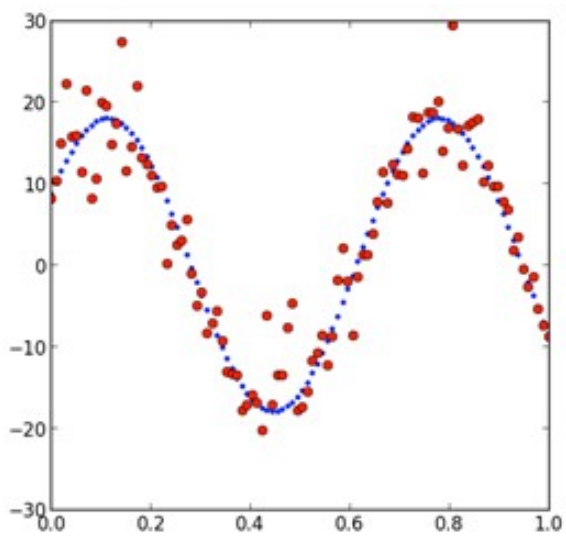
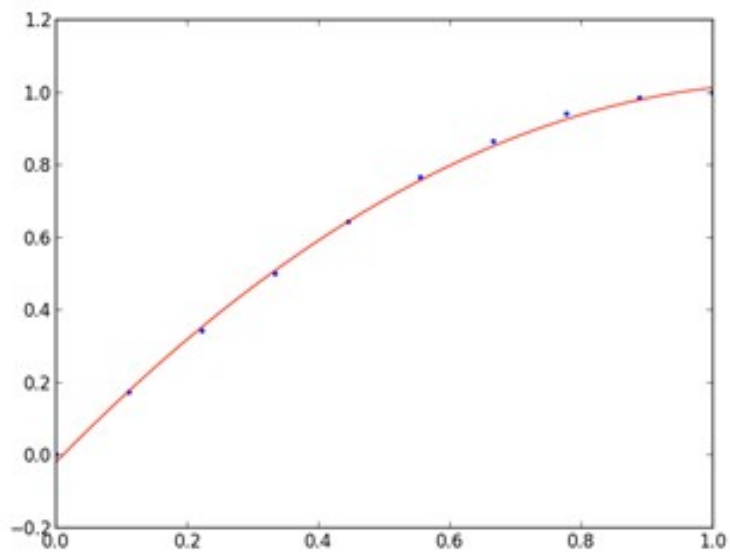
$$x^2 y'' + xy' + (x^2 - a^2) y = 0$$

$$x^2 y'' + xy' + (x^2 - a^2) y = \frac{4(x/2)^{a+1}}{\sqrt{\pi} \left(a + \frac{1}{2} \right)}$$

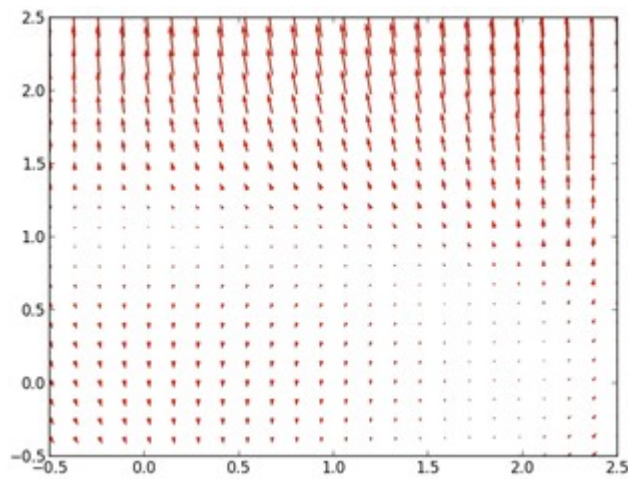








$$\begin{cases} x' = x^2 - 2x - y + 0.5 \\ y' = x^2 + 4y^2 - 4 \end{cases}$$



$$\text{expn}(n, x) = \int_1^{\infty} \frac{e^{-xt}}{t^n} dt \quad \text{exp1}(x) = \int_1^{\infty} \frac{e^{-xt}}{t} dt$$

$$\text{expi}(x) = \int_{-\infty}^x \frac{e^t}{t} dt \quad \text{dawsn}(x) = e^{-x^2} \int_0^x e^{t^2} dt$$

$$\text{erf}(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt \quad \text{erfc}(x) = \frac{2}{\sqrt{\pi}} \int_x^{\infty} e^{-t^2} dt$$

$$\text{spence}(x) = -\int_1^x \frac{\log t}{t-1} dt$$

$$\text{fresnel}(z) = \int_0^z \sin\left(\frac{\pi}{2}t^2\right) dt$$

$$\text{sici}(x) = \int_0^x \frac{\sin t}{t} dt, \quad \gamma + \log x + \int_0^x \frac{\cos t - 1}{t} dt$$

$$\text{shichi}(x) = \int_0^x \frac{\sinh t}{t} dt, \quad \gamma + \log x + \int_0^x \frac{\cosh t - 1}{t} dt$$

$$\gamma = \lim_{n \rightarrow \infty} \left(\sum_{k=1}^n \frac{1}{k} - \log n \right)$$

$$\text{ellipkm1}(m) = \int_0^{\pi/2} \frac{d\theta}{\sqrt{1-m \sin^2 \theta}} \quad \text{ellipe}(m) = \int_0^{\pi/2} \sqrt{1-m \sin^2 \theta} d\theta$$

$$\text{ellipkinc}(m, n) = \int_0^n \frac{d\theta}{\sqrt{1-m \sin^2 \theta}} \quad \text{ellipeinc}(m, n) = \int_0^n \sqrt{1-m \sin^2 \theta} d\theta$$

$$\text{gammainc}(a, x) = \frac{1}{\Gamma(a)} \int_0^x e^{-t} t^{a-1} dt$$

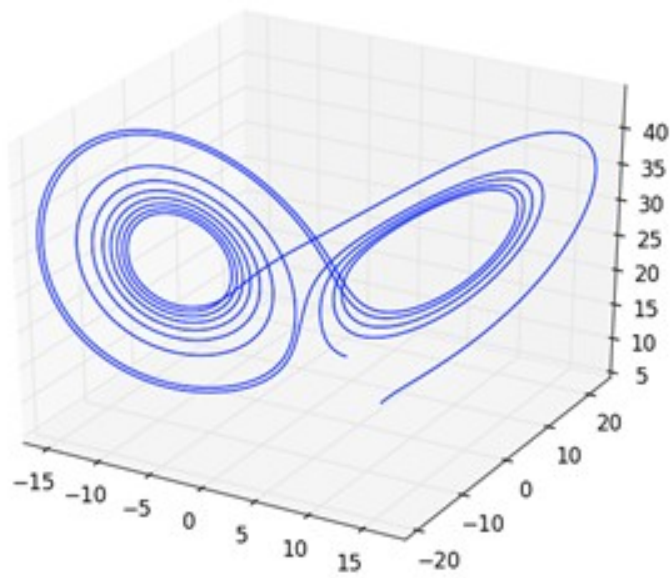
$$\text{gammaincc}(a, x) = \frac{1}{\Gamma(a)} \int_x^\infty e^{-t} t^{a-1} dt$$

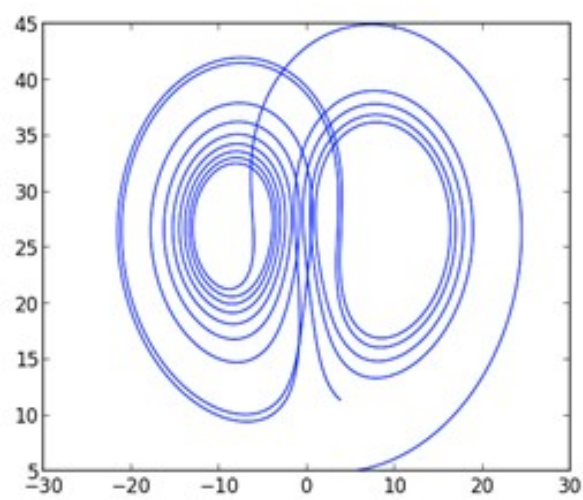
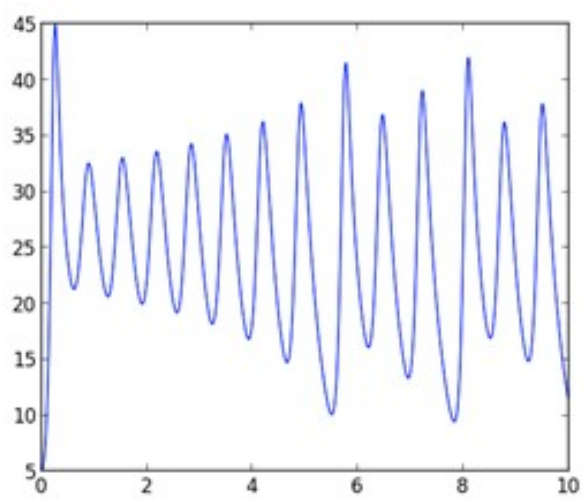
$$\text{betainc}(a, b, c) = \frac{\Gamma(a+b)}{\Gamma(a)\Gamma(b)} \int_0^x t^{a-1} (t-1)^{b-1} dt$$

$$\frac{dy}{dt} = f(t, y), \quad y(t) = (y_1(t), \dots, y_n(t)), t \in \mathbb{R}$$

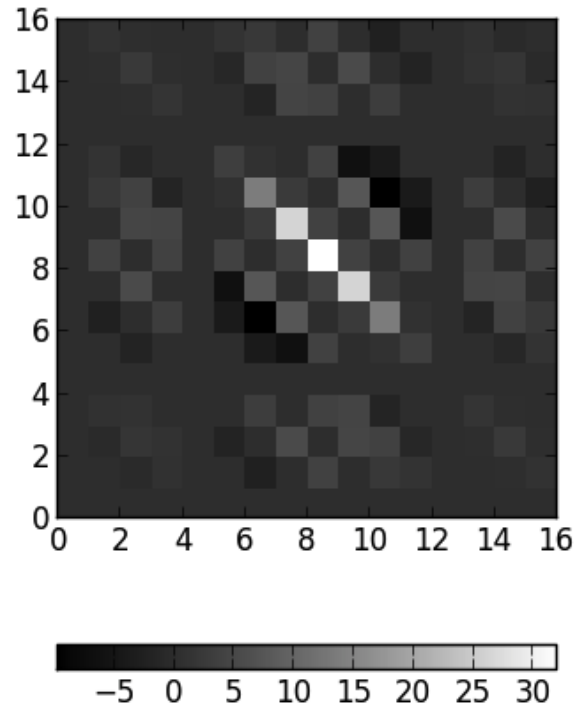
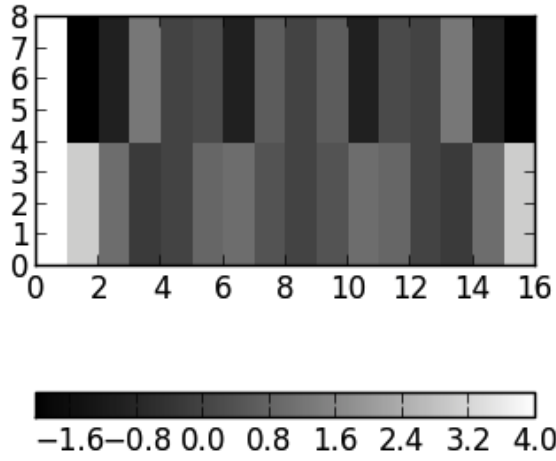
$$y' = -20y, \quad y(0) = 1$$

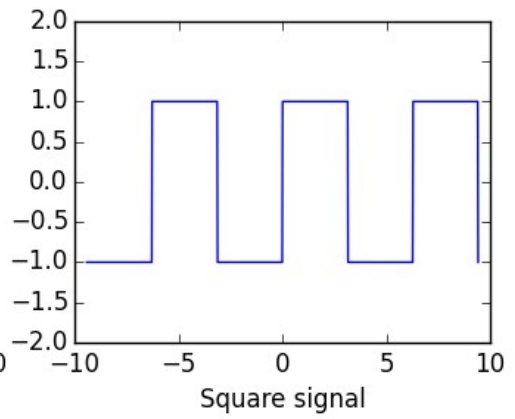
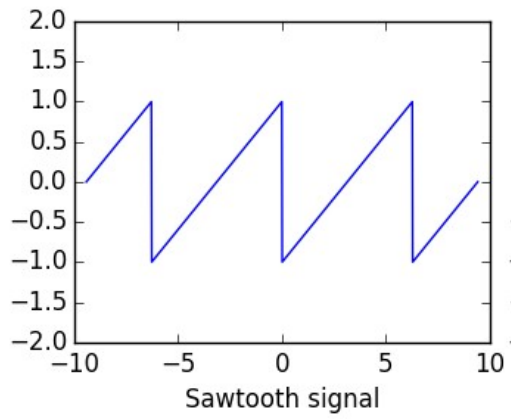
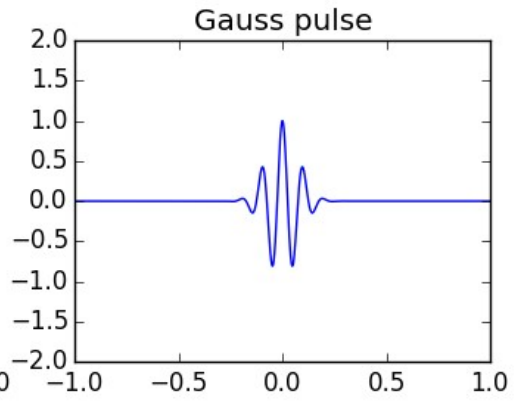
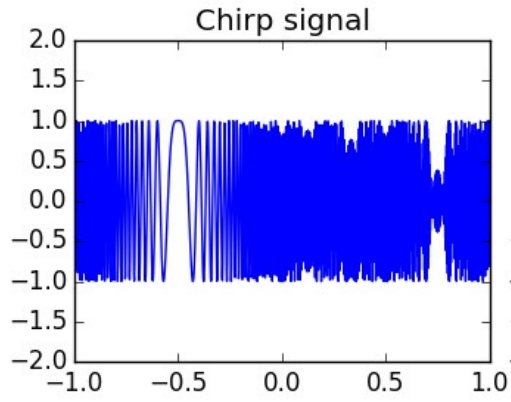
$$\begin{cases} \frac{dx}{dt} = \sigma(y - x) \\ \frac{dy}{dt} = rx - y - xz \\ \frac{dz}{dt} = xy - bz \end{cases}$$

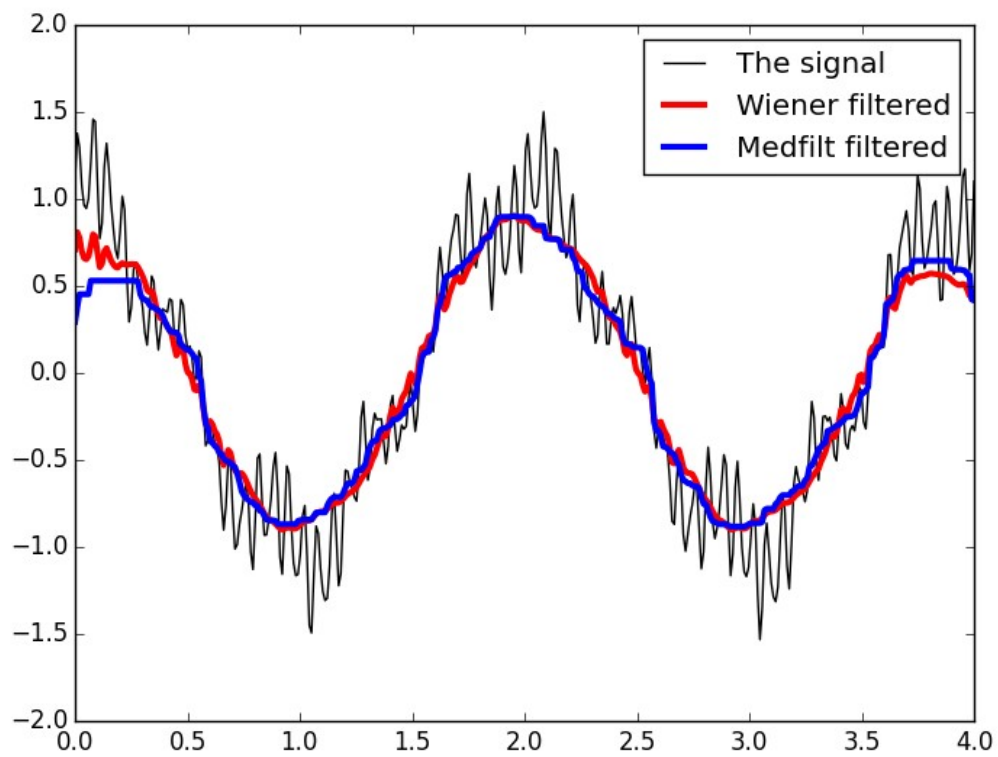


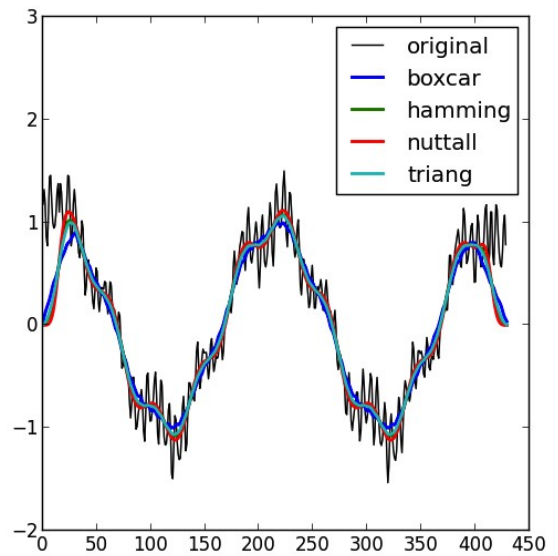
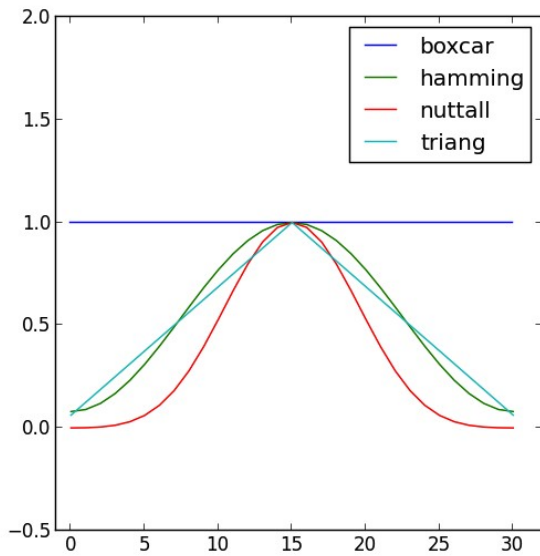
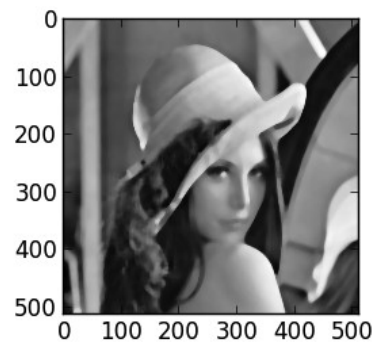
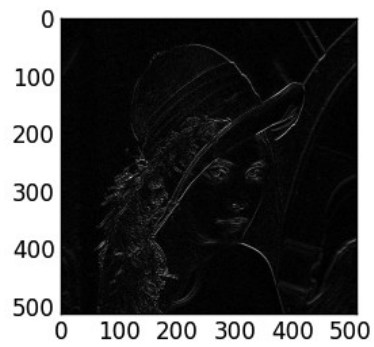
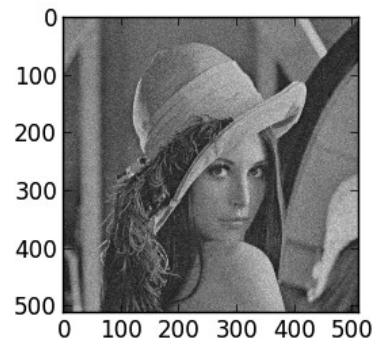
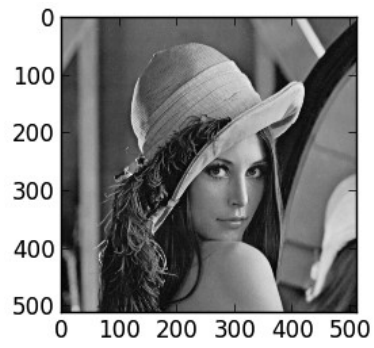


Chapter 5



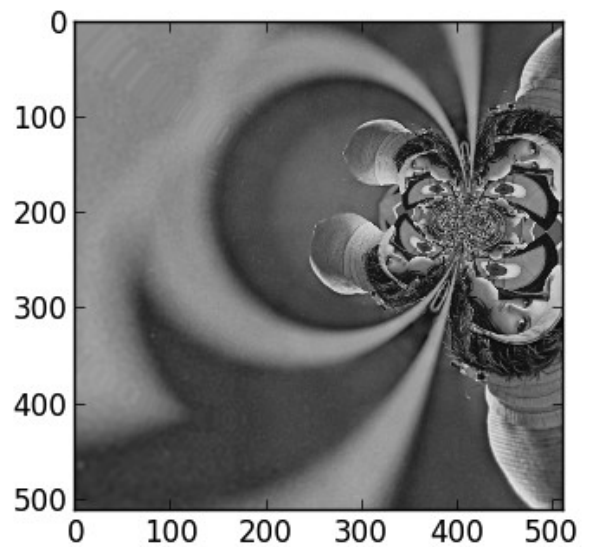
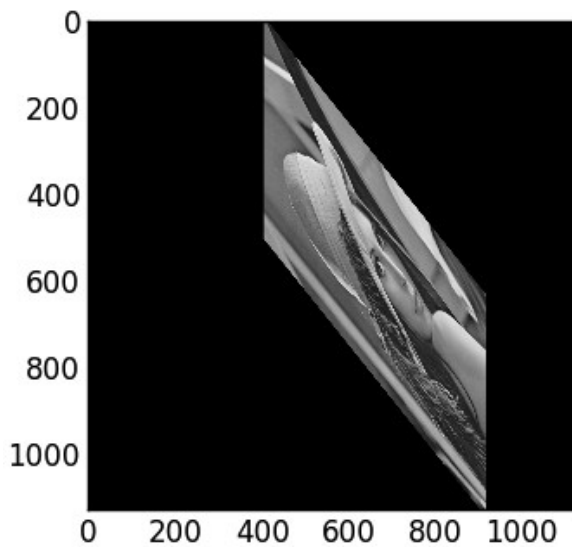






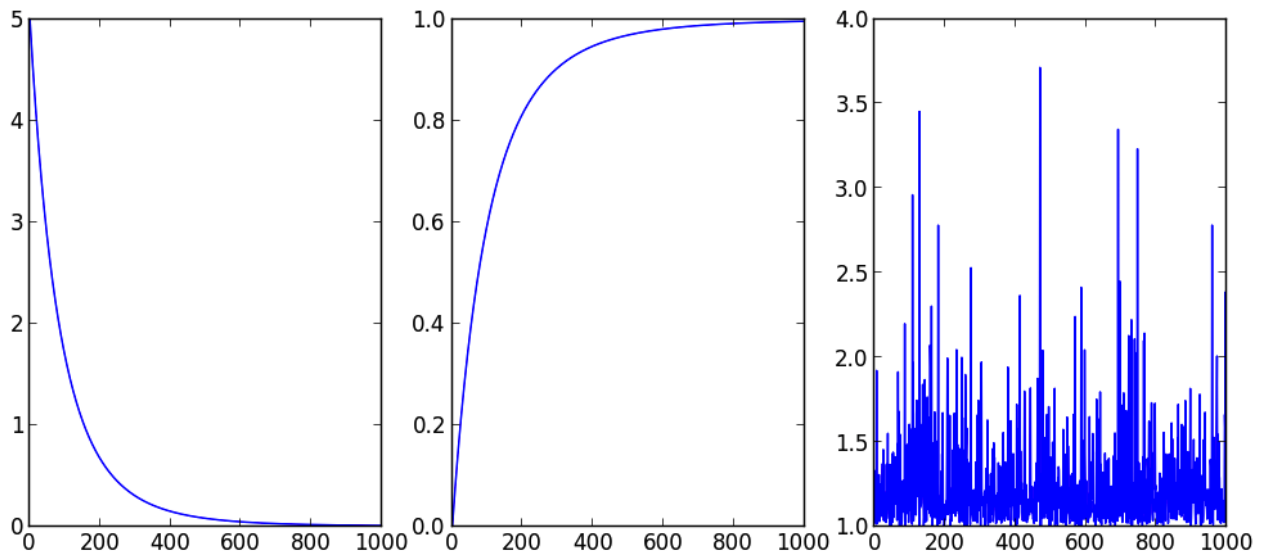
$$L(x, y) = \underbrace{\begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}}_A \begin{pmatrix} x \\ y \end{pmatrix} + \underbrace{\begin{pmatrix} b_1 \\ b_2 \end{pmatrix}}_b$$

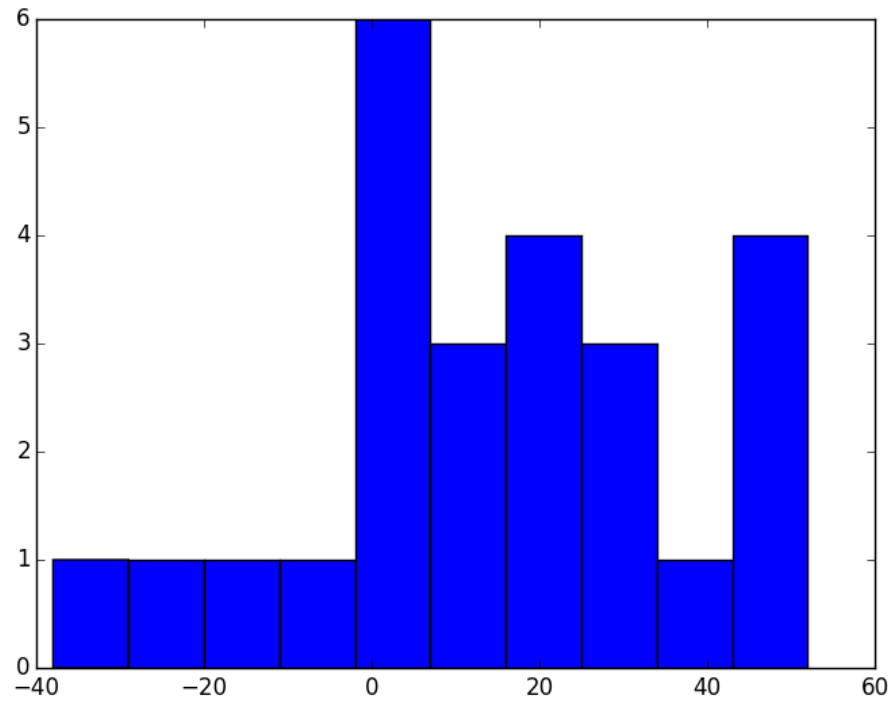
$$f(z) = \frac{az + b}{cz + d}$$

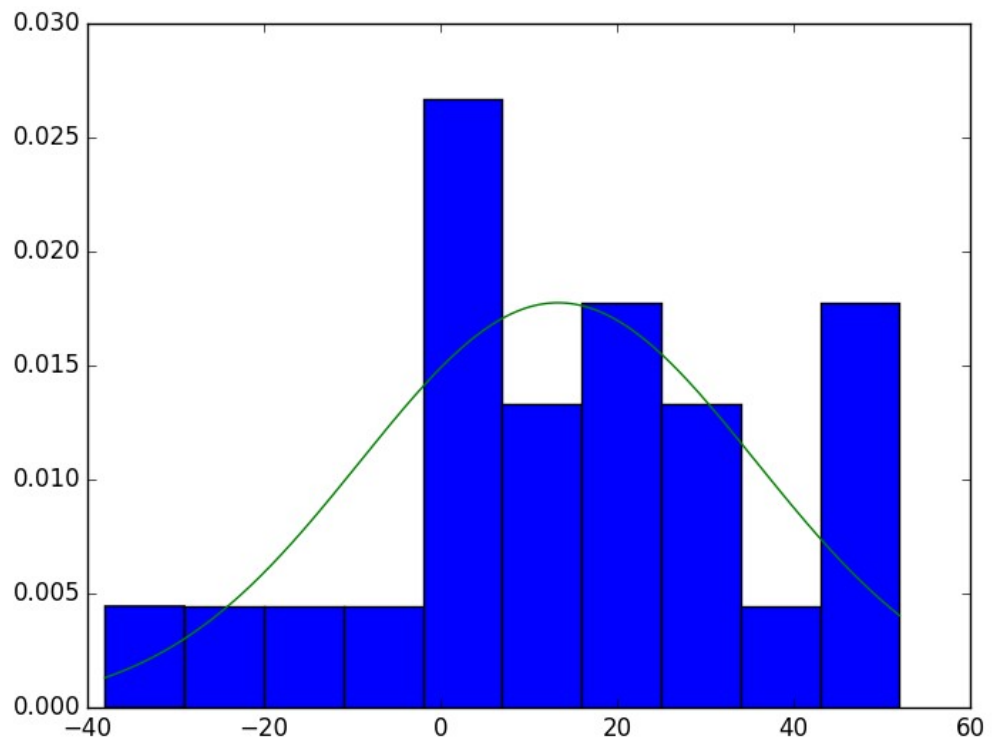


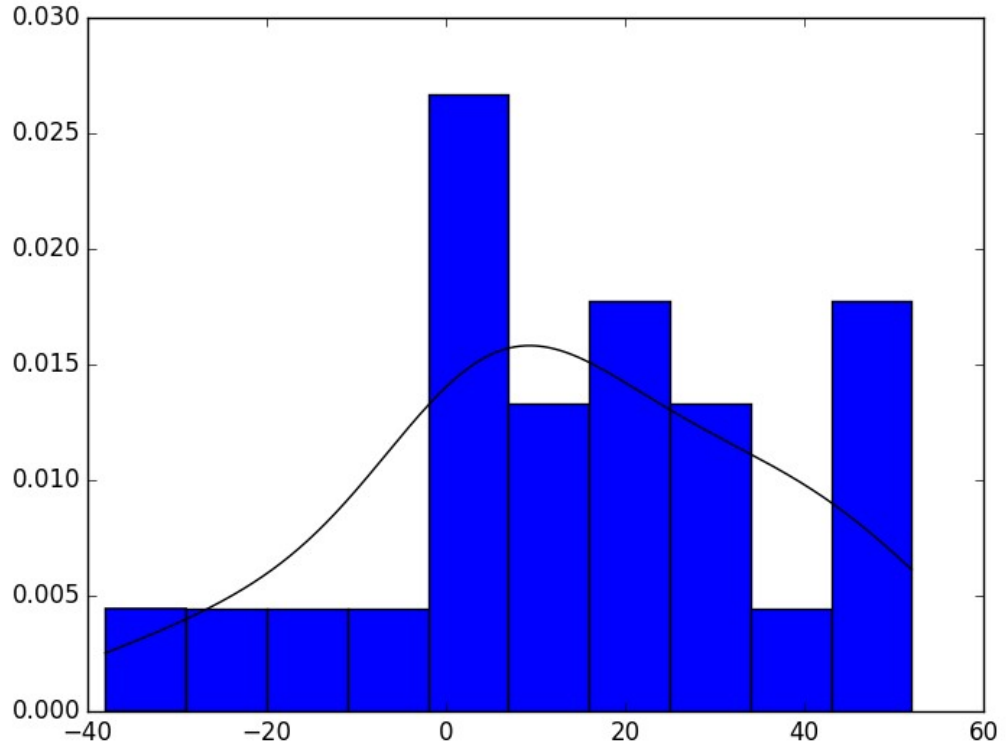
Alonso Quijano, the protagonist of the novel, is a retired country gentleman nearing fifty years of age, living in an unnamed section of La Mancha with his niece and housekeeper. While mostly a rational man of sound reason, his reading of books of chivalry in excess has had a profound effect on him, leading to the distortion of his perception and the wavering of his mental faculties. In essence, he believes every word of those books of chivalry to be true, though, for the most part, the content of those books is clearly fiction. Otherwise, his wits, in regards to anything other than chivalry, are intact. He decides to go out as a knight-errant in search of adventure. He dons an old suit of armour, renames himself "Don Quixote de la Mancha," and names his skinny horse "Rocinante". He designates a neighboring farm girl as his lady love, renaming her "Dulcinea de Toboso," while she knows nothing about this.

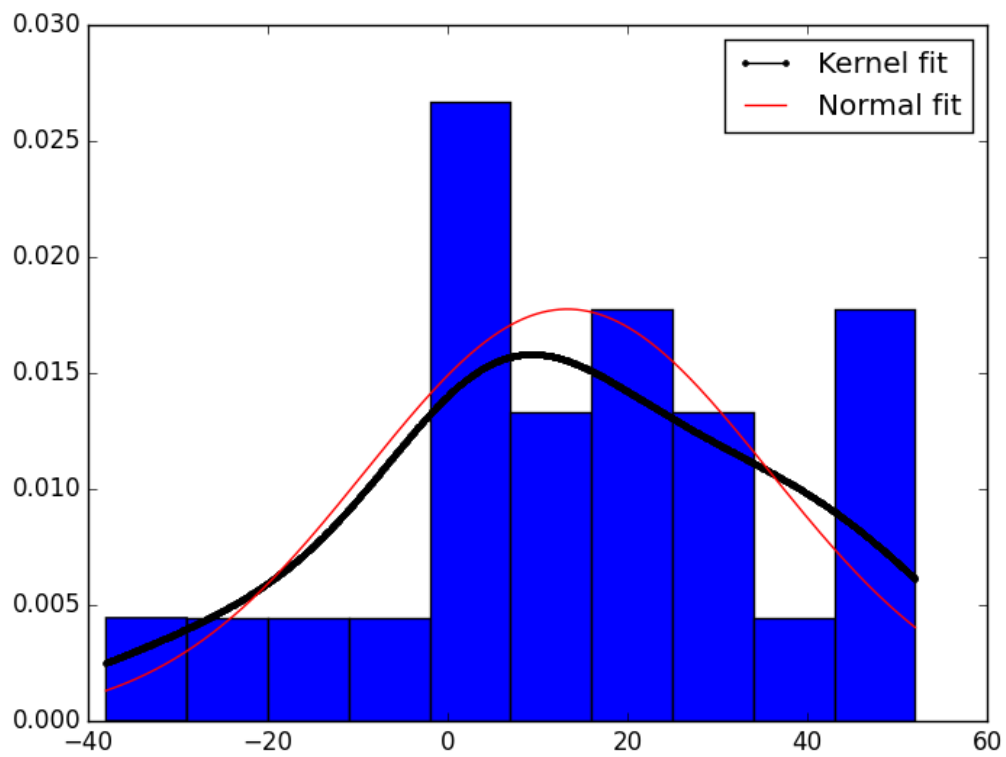
Chapter 6

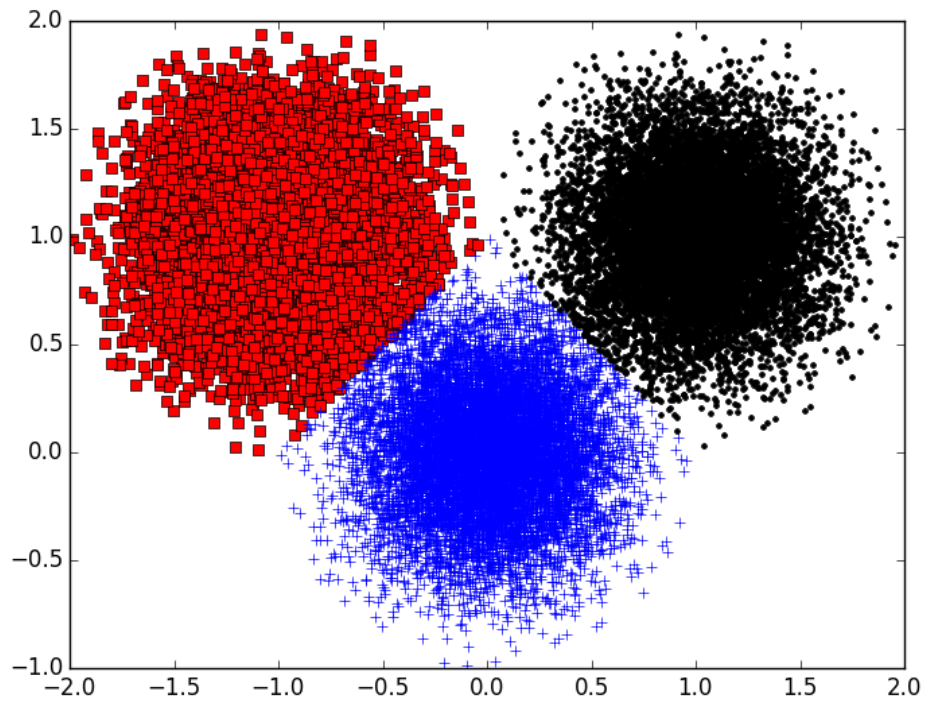
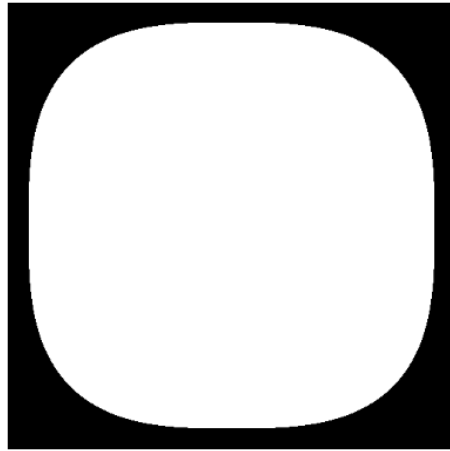


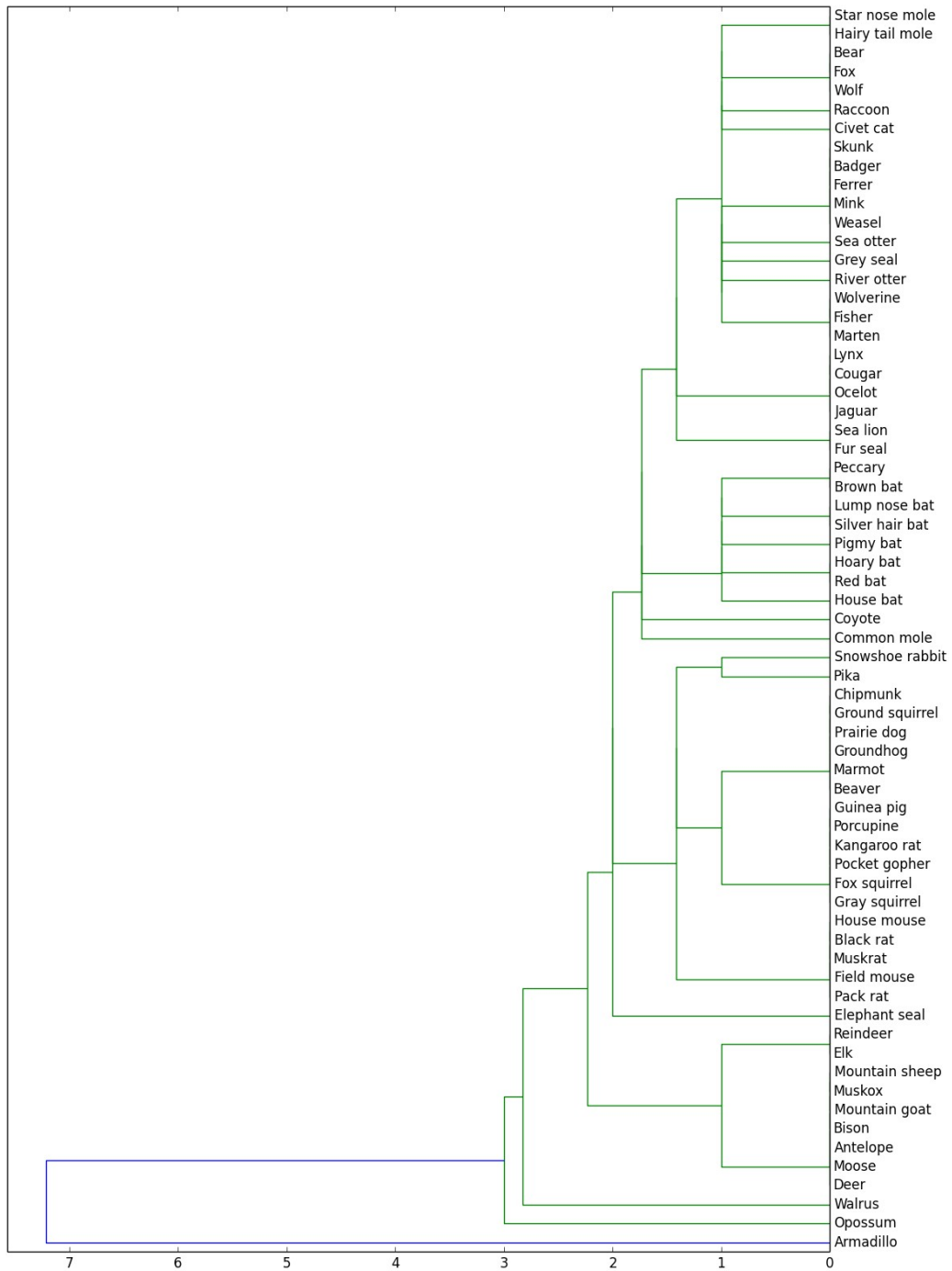




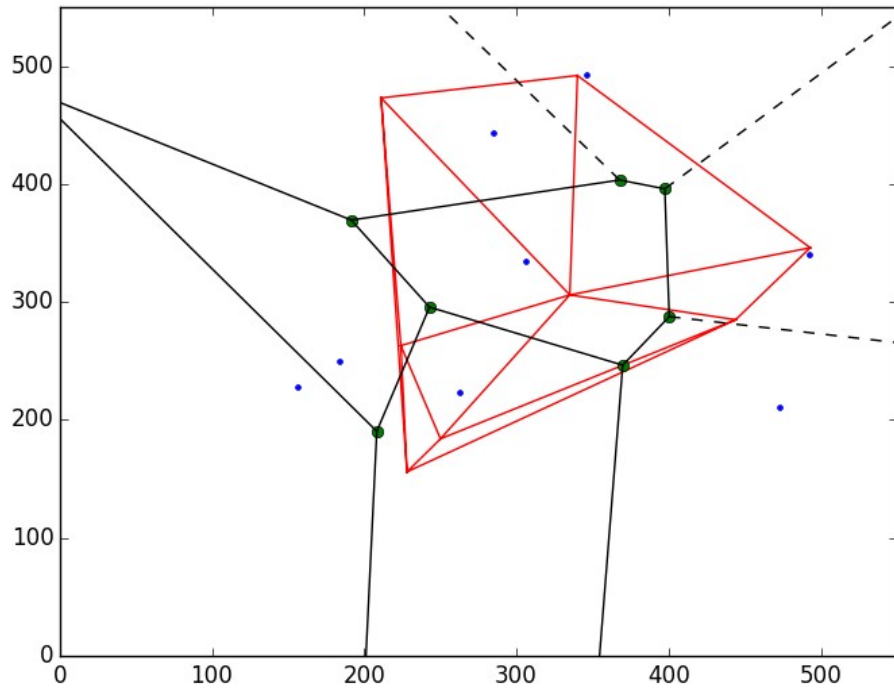


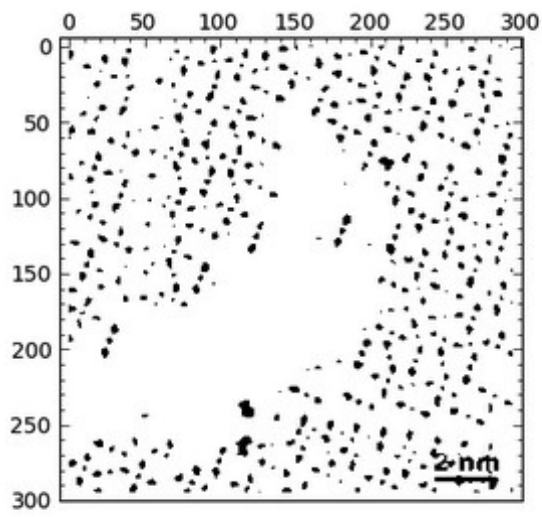
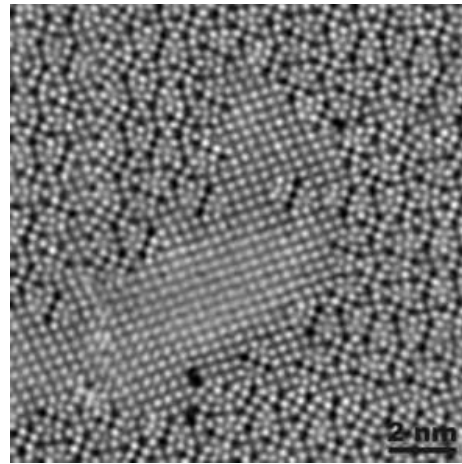




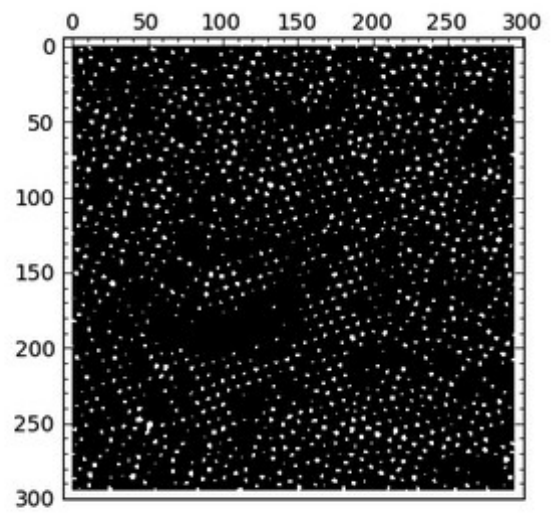


Chapter 7





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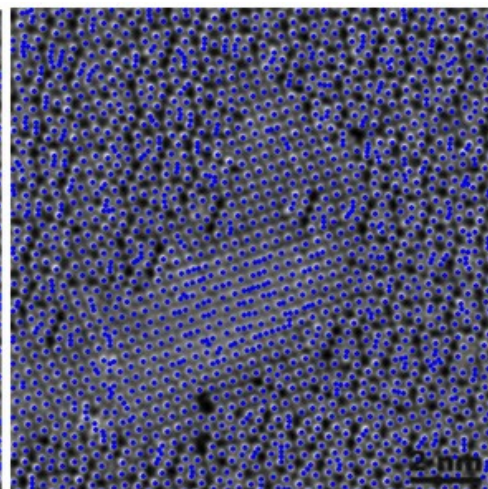
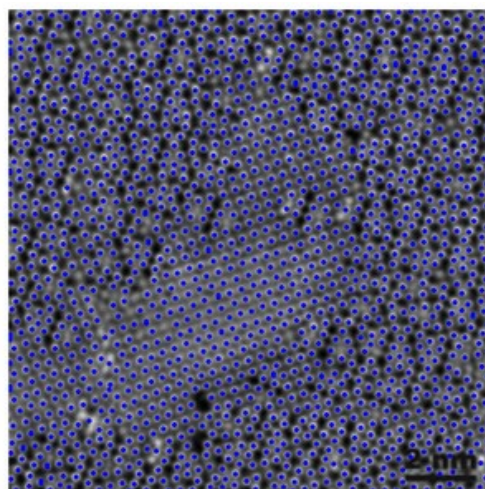


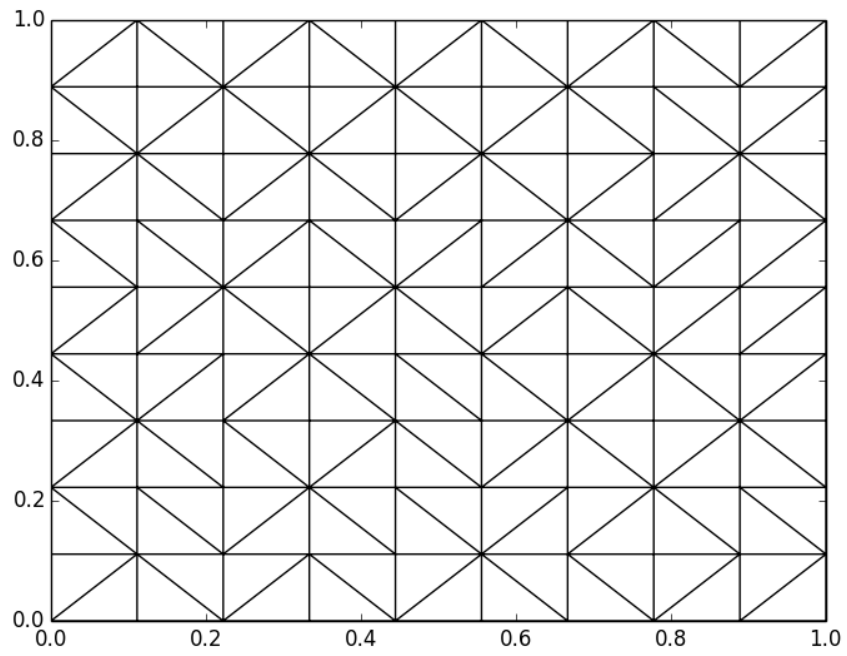
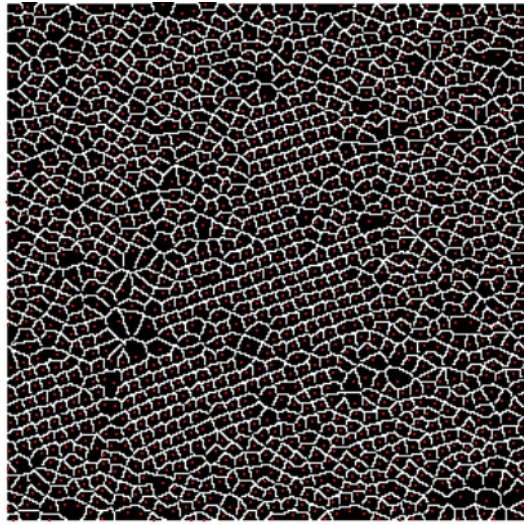
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1	1	1	1	1	0
1	1	1	1	0	0
1	1	1	0	0	0
0	0	0	1	1	1
0	0	0	1	1	1
0	0	0	1	1	1

0	1	0
1	1	1
0	1	0

1	1	1
1	1	1
1	1	1





$$\left\{ \begin{array}{l} \nabla^2 \phi(x, y) = 0 \\ \phi(x=0, y) = 0; \phi(x=1, y) = 1; y \neq 0 \text{ and } y \neq 1 \\ \phi(x, y=0) = \phi(x, y=1) = 0 \end{array} \right\}$$

$$\phi(x, y) = 2 \sum_{n=1}^{\infty} \left[\frac{1}{n\pi} - \frac{\cos(n)}{n\pi} \right] \frac{\sinh(n\pi x)}{\sinh(n\pi)} \sin(n\pi y)$$

