HW3 参考解答

5.41

```
clear all
close all

%-----Plot distribution----%
n = 18;
p = 0.7;
x = 0 : n;
%binomial distribution
yb = binopdf(x, n, p);
figure; plot(x, yb);
xlabel('number of seniors');
ylabel('probability');
title('Binomial distribution');
%hypergeometric distribution
yh = hygepdf(x, 17000, n, 17000*p);
figure; plot(x, yh);
xlabel('number of seniors');
ylabel('probability');
title('Hypergeometric distribution');

%-----Probability------%
pb = binocdf(13, n, p) - binocdf(9, n, p);
ph = hygecdf(13, 17000, n, 17000*p) - hygecdf(9, 17000, n, 17000*p);
fprintf('Probability of binomial : %f', pb);
fprintf('\nProbability of hypergeometric : %f\n', ph);
```

Comparison :

If *n* is small compared to *N*, the nature of the *N* items changes very little in each draw. (when $\frac{n}{N} \leq 0.05$)

Then binomial distribution can be used to approximate the hypergeometric distribution.

5.87

```
clear all
close all

%-----Plot distribution----%
n = 200;
p = 0.03;
x = 0 : n;
%binomial distribution
yb = binopdf(x, n, p);
figure; plot(x, yb);
xlabel('number of seniors');
ylabel('probability');
title('Binomial distribution');
%Poission distribution
yp = poisspdf(x, n*p);
figure; plot(x, yp);
xlabel('number of seniors');
ylabel('probability');
title('Poission distribution');

%-----Probability------%
pb = binocdf(0, n, p);
pp = poisscdf(0, n*p);
fprintf('Probability of binomial : %f', pb);
fprintf('\nProbability of Poission : %f\n', pp);
```

Comparison :

When $n \to \infty$, $p \to 0$, and $\mu = np$ remains constant.

$$b(x; n, p) \to p(x; \mu).$$