7.4

Exercise 4

A coin is biased so that the probability a head comes up when it is flipped is 0.6. What is the expected number of heads that come up when it is flipped 10 times?
10*0.6=6
the answer is 6 times

Exercise 8

What is the expected sum of the numbers that appear when three fair dice are rolled?
$3 * \frac{1+2+3+4+5+6}{6} = 10.5$
so we can get 10.5

Exercise 10

Suppose that we flip a fair coin until either it comes up tails twice or we have flipped it six times. What is the expected number of times we flip the coin?
if times is 2 $(0.5)^2 = 0.25$
if times is 3 $2 * (0.5)^3 = 0.25$
if times is 4 $3 * (0.5)^4 = 0.1875$
if times is 5 $4 * (0.5)^5 = 0.125$
if times is 6 $6 * (0.5)^5 = 0.1875$
$2 * 0.25 + 3 * 0.25 + 4 * 0.1875 + 5 * 0.125 + 6 * 0.1875 = 3.75$

Exercise 36

$$
\begin{aligned}
&p = \frac{3}{5} \\
&q = 1 - \frac{3}{5} = \frac{2}{5} \\
&E(X) = np \\
&= \frac{3n}{5} \\
&V(X) = npq \\
&= \frac{3n}{5} * \frac{2}{5} \\
&= \frac{6n}{25} \\
&p(|X(s) - \frac{3n}{5}| \geq \sqrt{n}) \leq \frac{6n}{25}/(\sqrt{n})^2 \\
&= \frac{6n}{25} * \frac{1}{n} \\
&= \frac{6}{25}
\end{aligned}
$$

9.1

Exercise 4

a) a is taller than b

Reflexive: No

Symmetric: No

Antisymmetric:Yes
Transitive:Yes

b) a and b were born on the same day
Reflexive: Yes
Symmetric: Yes
Antisymmetric:No
Transitive:Yes

c) a has the same first name as b
Reflexive: Yes
Symmetric: Yes
Antisymmetric:No
Transitive:Yes

d) a and b have a common grandparent
Reflexive: Yes
Symmetric: Yes
Antisymmetric:No
Transitive:No

Exercise 6

a) x+y=0
Reflexive: No
Symmetric: Yes
Antisymmetric:No

Transitive:No

b) x=$\pm y$
Reflexive: Yes
Symmetric: Yes
Antisymmetric:No
Transitive:Yes

c) x-y is a rational number.
Reflexive: Yes
Symmetric: Yes
Antisymmetric:No
Transitive:Yes

d) x=2y
Reflexive: No
Symmetric: No
Antisymmetric:Yes
Transitive:No

e) xy$\geq$ 0
Reflexive: Yes
Symmetric: Yes
Antisymmetric:No
Transitive:No

f)xy=0
Reflexive: No
Symmetric: Yes

Antisymmetric:No
Transitive:No

g) x=1
Reflexive: No
Symmetric: No
Antisymmetric:Yes
Transitive:Yes

h) x=1 or y=1
Reflexive: No
Symmetric: Yes
Antisymmetric:No
Transitive:No

Exercise 32

R=$(1,2),(1,3),(2,3),(2,4),(3,1)$
S=$(2,1),(3,1),(3,2),(4,2)$
$S \circ R = (1,1),(1,2),2,1),(2,2)$

Exercise 56

Show that the relation R on a set A is reflexive if and only if the complementary relation $\overline{R}$ is irreflexive.

$$a \in A(a,a) \in R(a,a) \notin \overline{R}a \in A(a,a) \notin \overline{R}(a,a) \in R$$

so R is reflexive if and only if $\overline{R}$ is irreflexive

9.4

Exercise 2

$$R = (a,b)/a \neq b = (a,b)/a \neq b \cup (a,a)/a \in Z = (a,b)/a,b \in Z = Z * Z$$

reflexive closure of R is the set.

Exercise 20

a)R^2

$$R^2 = R \circ R = (a,b) = (a,b)$$

the airline will be haev one stop in some intermediate ciyt

b)R^3

$$R^3 = R \circ R = (a,b) = (a,b)$$

the airline will be haev two stop in some intermediate ciyt

c)R^*

$$R^* = R \cup R^2 \cup R^3 \cup ..... \cup R^n will\ have\ n-1\ stop$$

it is possible to fly from a to b

9.5

Exercise 2

Which of these relations on the set of all people are equivalence relations? Determine the properties of an equivalence relation that the others lack.
a) (a, b) — a and b are the same age
equivalence relation

b) (a, b) — a and b have the same parents
equivalence relation

c) (a, b) — a and b share a common parent
not Transitive

d) (a, b) — a and b have met
not Transitive

e) (a, b) — a and b speak a common language
not Transitive

Exercise 10

$$(x, y) \in R \to x, y \in [X]R \to f(x) = x_0 = f(y)$$
$$f(x) = f(y) \to x_0 = y_0 \to [X]R = [y]R \to \in [x]R \to (x, y) \in R$$
$$(x, y) \in R \quad x, y \in A$$
$$(x, y) \in R \quad f(X) = f(y) = c_1$$
$$(x, y) \in R \quad f(x) = f(y)$$

the function f defined above satisifes the required condition.