Page: note

\[(ab)c = a(bc)\]

Pick a small

then \[(a \cdot b) \cdot c = a \cdot (b \cdot c)\]

may be false.
String: immutable
vs.
String Buffer: mutable

Ex.

```java
String a = "one";
String b = "two";

a += b; // a = a + b;
```

Ex. `Integer` to `String`
Chapter 7: Inheritance

Recall all classes descend from Object:

```
Object
  
Person  Rational
  
Scanner  String
```

To create a subclass of a class use `extends`.
Ex

class Foo {}

class Bar extends Foo {};

Object
  | Foo
  | Bar

now can declare variables of type Foo and Bar.
Foo f = new Foo();
Bar b = new Bar();

f \rightarrow \text{Foo object}

b \rightarrow \text{Bar object}

\text{Foo part of Bar}

any member variable or method belonging to f also belongs to b, not conversely

in other words:

"a Bar is a Foo"
an object of type \texttt{Bar} can be referred to by a variable of type \texttt{Foo}. The reverse is false.

\begin{align*}
\text{\texttt{f}} &= \text{\texttt{b}}; \\
\text{\texttt{b}} &= \text{\texttt{f}};  \\
\text{\texttt{b = f;}} & \text{ // syntax error}
\end{align*}
Subtype principle

A subclass object can always be used where an object of its superclass is expected.

One consequence:

Reference variables may bind down lines of ancestry, but not up.