Variance
Positions

Variance Positions

Val & var fields are in <u>covariant</u> position

```scala
class Vet[-T](val favoriteAnimal: T) // error: contravariant type T is in covariant position
```

Var fields are <u>also in contravariant</u> position

```scala
class MyOption[+T](var contents: T) // error: covariant type T is in contravariant position
```

Method argument types are in <u>contravariant</u> position

```scala
class MyList[+A] {
  // error: covariant type A is in contravariant position
  def add(element: A): MyList[A] = ???
}
```

Method return types are in <u>covariant</u> position

```scala
abstract class Vet[-T] {
  // error: contravariant type T is in covariant position
  def rescueAnimal(): T
}
```

Overcoming Problems

Method args & covariance: <u>widen the type</u>

```
abstract class LList[+A] {
  def add[B >: A](element: B): LList[B]
}
```

Method return types & contravariance: <u>narrow the type</u>

```
class RepairShop[-A <: Vehicle] {
  def repair[B <: A](vehicle: B): B = vehicle
}
```

Scala rocks