Generic function programming

R’s “S3” class system relies on *generic* functions. A call to a generic function is dispatched (by UseMethod()) to the appropriate class-specific method.

class(x) gets or sets the character class name of object x. e.g. class(3.14), class(m <- lm(mpg ~ wt, mtcars))

An S3 method has the name GENERIC_FUNCTION_NAME.CLASS_NAME(). e.g. print() is a generic and print.lm() and print.data.frame() are methods. e.g.

print # note call to UseMethod("print")
g = list(name="Margaret", age=2)
class(g) = "girl"
b = list(name="Philip", age=11)
class(b) = "boy"
print.girl = function(x) {
    cat(sep="", toupper(x$name), ", ", x$age, "\n") # girls get upper case
}
print.boy = function(x) {
    cat(sep="", tolower(x$name), ", ", x$age, "\n") # boys get lower case
}
print(g)
print(b)

e.g. ?abline has a parameter reg that is “an object with a coef method.”

plot(x=0:3, y=3:0)
coef.girl = function(object, ...) {
    return(c(object$age, 0)) # horizontal line with y-intercept age
}
abline(g)

In homework 2, we’ll write a package that implements a class for which we’ll include print, coef, and predict methods.

methods(generic.function, class) lists available methods for generic.function or class. e.g. methods(print), methods(coef), methods(class="girl"), methods(class="lm")

For more, see [http://adv-r.had.co.nz/00-essentials.html](http://adv-r.had.co.nz/00-essentials.html) and the section “7 Generic functions and methods” in [http://cran.r-project.org/doc/manuals/r-release/R-exts.html](http://cran.r-project.org/doc/manuals/r-release/R-exts.html).