1 Prediction

Suppose we want to know the predicted value $\hat{y}$ at x = 30. Could write out the equation using the parameter estimates and fill in the required value for x:

```
>19.94379 + 2.07497*30
[1] 82.19289
```

Alternatively, could use the predict function:

```
predict(model,list(x=30))
1
82.19289
```

For linear plots use abline for superimposing the model on a scatterplot of the data points. For curved responses, use the predict function to generate the lines.

1.1 Confidence and Prediction Intervals

Fitted lines are often presented with uncertainty bands around them. There are two types of bands:

- Confidence bands - refer to the POPULATION.
- Prediction bands - refer to an INDIVIDUAL.

One way to get intervals:

```
predict(model, interval="confidence")
predict(model, interval="prediction")
```

In order plot the bands on the same plot as the fitted line, use the following:

```
grid <- seq(5,50)
pi <- predict(model, list(x=grid), interval="prediction")
ci <- predict(model, list(x=grid), interval="confidence")
plot(SLR1$x, SLR1$y, xlab="x", ylab="y")
matlines(grid, pi, lty=c(1,2,2), col=c("black", "blue","blue"))
matlines(grid, ci, lty=c(1,3,3), col=c("black", "red","red"))
legend("bottomright", legend=c("Prediction Interval", "Confidence Interval"),
lty=2:3, col=c("blue","red"), bty="n")
```