Q2

$$\hat{g} = \arg\min_{g} \left(\sum_{i=1}^{n} (y_i - g(x_i))^2 + \lambda \int \left[g^{(m)}(x) \right]^2 dx \right),$$

where $g^{(m)}$ represents the mth derivative of g (and $g^{(0)}$ [illegible]

For all of (a) – (d): this sigma not counted, because is positive and constant. Arg min forces the integral to be near 0

(a) m = 0 $g^{(0)}$ -> 0 => **g(x) = 0** will minimize the area (integral)

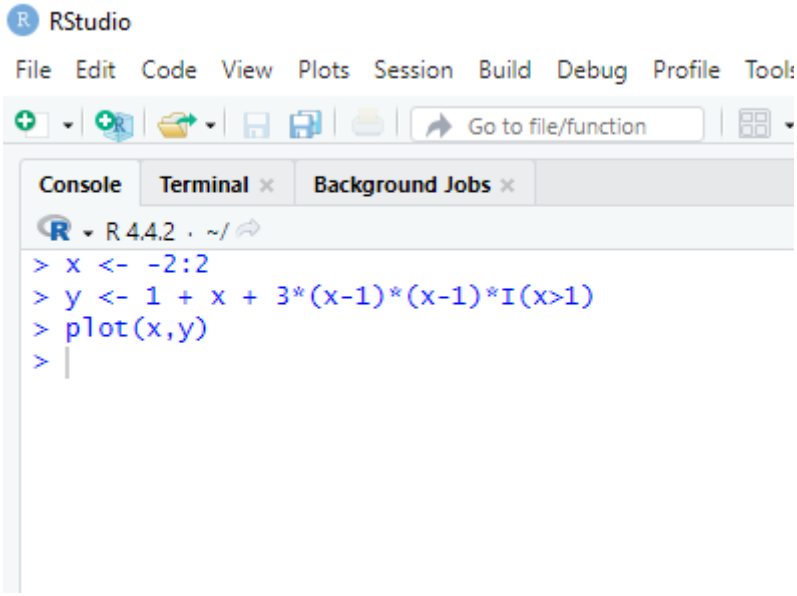
(b) m = 1 $g^{(1)}$ -> 0 => $\hat{g}$ = constant (c)

(c) m = 2 $g^{(2)}$ -> 0 => $\hat{g}$ = c*x + d

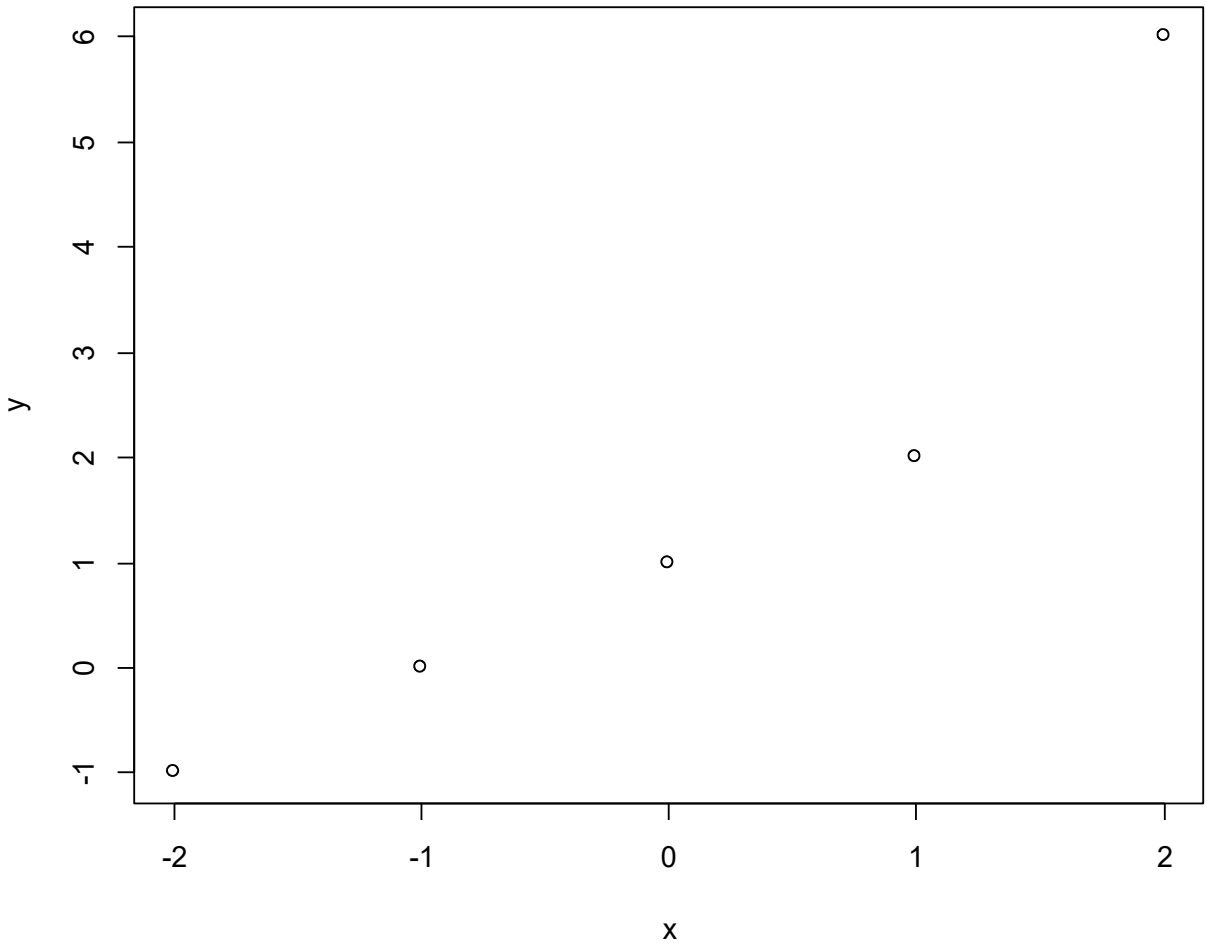
(d) m = 3 $g^{(3)}$ -> 0 => $\hat{g}$ = c*x^2 + d*x + k

(e) The integral not counted. In this case g is a spline itself.

Q3



*** PLOT ON THE NEXT PAGE ***


y
-1
0
1
2
3
4
5
6
-2
-1
0
1
2
x