1. Solve the following equations in $\mathbb{R}$ (note that $\mathbb{R}$ refers to the real numbers, not to the statistics software R):

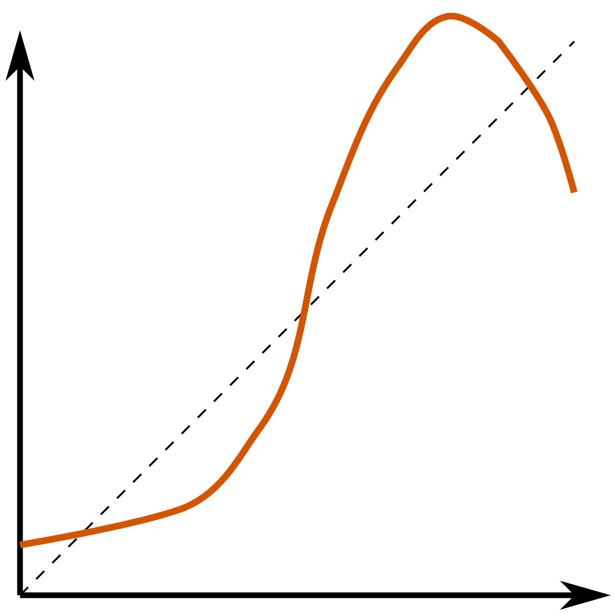
(a) $x^2 + 3x + 2 = 0$

(b) $2x^2 + 5x = 3$

(c) $4(x - 1) = x^2$

(d) $(e^{12x})^x \cdot e^{x+1} = 1$

2.



If a certain population has a size x in the current generation, the size in the next population is modeled as $f(x)$, where f is the function whose graph is shown to the right. Apply cobwebbing to check which fixed points are unstable, locally stable or globally stable.

3. Assume a population whose size follows the reproductive rule

$$x_{n+1} = f(x_n) = m + (1 - d) \cdot x_n + r \cdot x_n^2$$

with $m \geq 0$, $0 \leq d$ and $r \geq 0$.

(a) Describe a possible biological situation for which such a model could be appropriate. What is the meaning of the parameters m, d and r?

(b) Try to find combinations of parameter values for m, d and r such that

(i) there are no fix points,

(ii) there is exactly one fix point,

(iii) there are two fix points,

(iv) there is an unstable fix points,

(v) there is a stable fix point.