MA 304: Homework 2 (due Friday January 31, 2020)

Reading

Sections 2.1, 2.2

1. Section 2.1, page 31, Problem 7c
2. Section 2.1, page 31, Problem 12
3. (a) Find the general solution for
$$\frac{dy}{dx} + 2xy = 1$$
(b) Given that $y(2) = 1$, estimate $y(3)$.
4. Section 2.2, page 38, Problem 2
5. Solve the initial value problem
$$y' = xy^3(1 + x^2)^{-1/2}, \quad y(0) = 1$$
and determine the interval on which the solution is defined.
6. Solve
$$\frac{dx}{dt} = 2 - tx^2 - t + 2x^2$$
Hint: factor the right hand side into the form $g(t)h(x)$
7. Find the general solution to the ODE describing the deer population from Homework 1,
$$\frac{dP}{dt} = rP\big(1 - \frac{P}{N}\big)$$
where N and r are constants.
Use your solution to determine $\lim_{t\to\infty} P(t)$