

Dynamics Worksheet 6: Review

1. (a) Solve the following recurrence relation.

$$\begin{aligned}a_n &= 2a_{n-1} - 2a_{n-2} \\ a_0 &= 1 \quad a_1 = 1\end{aligned}$$

(b) What is a_{100} ?

2. Compute the following indefinite integral.

$$\int \frac{x}{x^2 - 4} dx$$

3. Solve the following differential equation.

$$y' = \frac{y^2 - 4}{t^2 y + y}$$

4. Solve the following differential equation

$$(t^2 - 4)y' + t(y + 8) = 2t^3.$$

5. For what values of a does the following differential equation have a solution?

$$\begin{aligned}y'' + ay' + \frac{5a^2}{4}y &= 0 \\ y(0) = 1 \quad y(\pi) &= 2\end{aligned}$$

6. You poll 140 randomly selected people and find the following results: 30 people like ketchup and support NAFTA, 50 people dislike ketchup and support NAFTA, 50 people like ketchup and oppose NAFTA, and 10 people dislike ketchup and oppose NAFTA. You believe that liking ketchup is not independent from supporting NAFTA. Test this hypothesis.
7. There is an urn with an unknown number of balls, some of which are white and some of which are black. You draw 20 balls from the urn with replacement and 7 of them are black. Find a 95% confidence interval for the fraction of balls in the urn that are black.