

MATH 320, Spring 2013, Assignment 1

Textbook Questions

- Section 1.1, #9** Verify by substitution that $y = 1/(1+x^2)$ is a solution of $y' + 2xy^2 = 0$. (Prime denotes derivativation with respect to x .)
- Section 1.1, #12** Verify by substitution that $y_1 = x \cos(\ln(x))$ and $y_2 = x \sin(\ln(x))$ are solutions of $x^2y'' - xy' + 2y = 0$. (Prime denotes derivativation with respect to x .)
- Section 1.1, #25** Verify $y(x) = \tan(x^3 + C)$ is a solution of $y' = 3x^2(y^2 + 1)$. Determine a value of the constant C so that y satisfies the initial condition $y(0) = 1$. Sketch several typical solutions of the given differential equation, and highlight the one that satisfies the given initial condition.
- Section 1.1, #34** Write a differential equation that is a mathematical model of the following situation: The acceleration dv/dt of a Lamborghini is proportional to the difference between 250 km/h and the velocity of the car.
- Section 1.2, #18** Find the position function $x(t)$ of a moving particle with the given acceleration $a(t) = 50 \sin(5t)$, intial condition $x_0 = 8$, and initial velocity $v_0 = -10$.