

MATH 253
Handout # 5

A

1. Solve $y' + y \sin x = \cos x \sin x$, $y\left(\frac{\pi}{2}\right) = 3$.
2. Find the Taylor polynomial of degree 3 of $f(x) = \ln(3x - 2)$ around $a = 1$, then use it to approximate $\ln 2$.
3. Find the general solution, in the explicit form, of $(x + 1)y' + (1 + y)x^2 = 0$.
4. Find the solution, in the simplest form, of the initial value problem $y' = \frac{y}{x - y}$ $y(-2) = 1$.

B

1. Find the quadratic approximation of $f(x) = e^{1-4x^2}$ around $a = \frac{1}{2}$, then use it to approximate $e^{\frac{3}{4}}$.
2. Find the general solution of $y' - 2xy = x$.
3. Find the general solution, in the explicit form, of $(x^2 + 1)y' + 2(1 + y)x^2 = 0$.
4. Find the general solution, in the simplest form, of $y' = \frac{y}{x + y}$.

C

1. Find the Taylor polynomial of degree 3 of $f(x) = \arctan(3x)$ around $a = 0$, then use it to approximate $\pi = 4 \arctan 1$.
2. Find the general solution of $xy' = x^2 + y$.
3. Find the general solution, in the simplest form, $(x + y)y' + y - 3x = 0$.
4. Find the explicit solution of the initial value problem $x \sin y + y'(x^2 + 1) \cos y = 0$, $y(0) = -\frac{\pi}{2}$.

D

1. Solve $y' - y = e^x \ln x$, $y(1) = -1$.
2. Find the Taylor polynomial of degree 3 of $f(x) = e^{1-x^2}$ around $a = -1$, then use it to approximate $e^{\frac{3}{4}}$.
3. Solve the initial value problem $yy' = 2y - x$, $y(1) = 0$. Can you find a solution satisfying $y(0) = 0$?
4. Find the general solution of $x \ln x \cdot y' = y$.