2015–16 **MAT371 Diferansiyel Denklemler – Ödev 5** N. Course

SON TESLİM TARİHİ: Salı 24 Kasım 2015 saat 10:00'e kadar.

Egzersiz 11 (Exact ODEs). [4 × 5p] Are the following ODEs exact or not exact? [40p] If the ODE is exact, then find the solution [If the ODE is not exact, then you do not need to solve it].

(a) $(2x+3)+(2y-2)y'=0$,

(b) $(2x+4y)+(2x-2y)y'=0$,

(c) $\frac{dy}{dx}=-\frac{ax-by}{bx-cy}$, $\quad a,b,c\in\mathbb{R},\ b\neq 0$,

(d) $\frac{dy}{dx}=-\frac{ax+by}{bx+cy}$, $\quad a,b,c\in\mathbb{R},\ b\neq 0$.

Egzersiz 12 (Exact ODEs). Consider

$$y+(2x-ye^y)\frac{dy}{dx}=0.$$

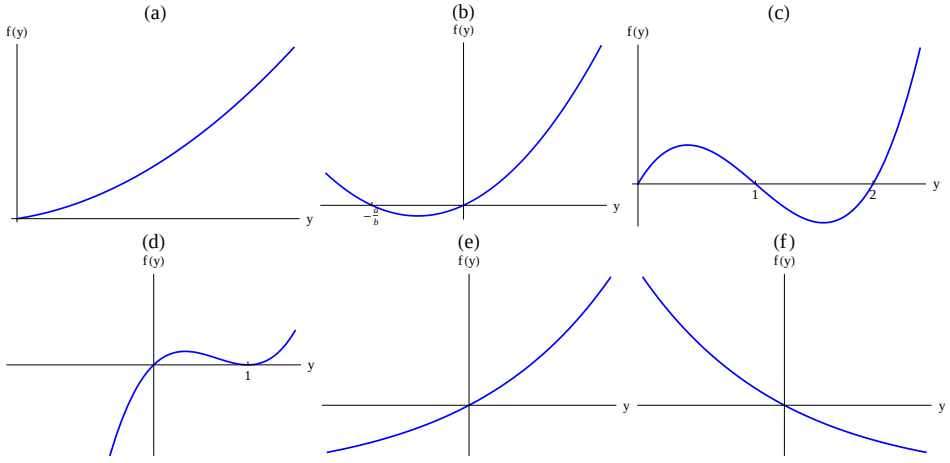
(a) [10p] Is this equation exact ($M_y=N_x$)?

(b) [5p] Multiply the equation by the integrating factor $\mu(x,y)=y$. Show that the equation is now exact.

(c) [25p] Now solve the equation that you wrote in (b).
[HINT: First, you need to find ψ such that $\psi_x=\mu M$ and $\psi_y=\mu N$. Then the solutions are given by $\psi(x,y)=c$.]

Ödev 4'ün çözümleri

9.



(a) $y=0$ is unstable, (b) $y=-a/b$ is asymptotically stable, $y=0$ is unstable,
(c) $y=1$ is asymptotically stable, $y=0$ and $y=2$ are unstable,
(d) $y=0$ is unstable, $y=1$ is semistable,
(e) $y=0$ is unstable, (f) $y=0$ is asymptotically stable.

10. (a) $y=0$ is unstable, $y=1$ is asymptotically stable.
(b) $y(t)=\frac{y_0}{y_0+(1-y_0)e^{-\alpha t}}$.
(c) $\lim_{t\to\infty}y(t)=\lim_{t\to\infty}\frac{y_0}{y_0+(1-y_0)e^{-\alpha t}}=\frac{y_0}{y_0+0}=1$.