Ch 7 Review

Exam 3 Friday

12:30 – 2:30

8 questions

Upload 8 separate photos

PDF ok

→ JPG best

→ HEIC less good

Backup

If Canvas fails

email me soon

submit attachments

Question types

8 problems total

1 discussion

#1

given guess solution

check it

works?

does not work?

7.2 [slope field
equilibrium solns

Given

$\frac{dy}{dt} = f(y,t)$

7.3 Euler's method sketch

Given

t_i	y_i	$\frac{dy}{dt}$	Δy
–	–	–	–
–	–	–	–
–	–	–	–

$\frac{dy}{dt} =$ ______ $f(y,t)$

$y(t_0) = y_0$

7.4 solve D.E.s using separation of variable

7.5 }
7.6 } wordy descriptions

$\downarrow$

D.E.

$\downarrow$

solution

(1)
(2) see notes
(3)

Study ① Vocabulary (facts, theorem, formula)
② practice problems

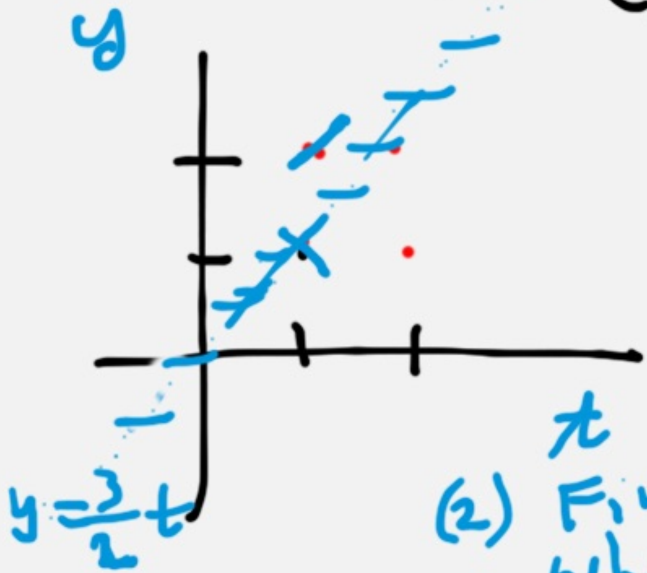
7.2

(1) Slope field ex

given $\frac{dy}{dt} = 2y - 3t$

Sketch 4 points in slope field

at $(1,1)$, $(1,2)$, $(2,1)$, $(2,2)$



$\left.\frac{dy}{dt}\right|_{(1,1)} = 2\cdot 1 - 3\cdot 1$
$= -1$

$\left.\frac{dy}{dt}\right|_{(1,2)} = 2\cdot 2 - 3\cdot 1$
$= 1$

(2) Find all points (t,y) where $dy/dt = 0$ $\quad 2y - 3t = 0$

7.1 3,6

#3 $\frac{dy}{dt} = \boxed{-k(y+A)}$

✓ A. LHS

$$\frac{d}{dt}\left(\boxed{-A+Ce^{-kt}}\right) = 0 - Cke^{-kt}$$

RHS

$$-k(y+A) = -k(-\cancel{A}+Ce^{-kt}+\cancel{A})$$

✗ B LHS

$$\frac{d}{dt}\left(A+Ce^{-kt}\right) = -kCe^{-kt}$$

$$-k(A+Ce^{-kt}+A) = -2Ak - kCe^{-kt}$$

7.1 #6 b

$$\frac{d^2h}{dt^2} = -kh$$

solutions $h(t) = \boxed{4\sin(3t)}$

$k = ?$

LHS

$[4\sin 3t]''$

$= -36\sin(3t)$

RHS

$-kh(t)$

$-k4\sin 3t$

$-36 = -k4 \quad k = 9$

t_i	y_i	$\frac{dy}{dt}$	Δy
0	1	-1	$\frac{dy}{dt}\cdot\Delta t = -.2$
.2	$1+-.2 = .8$	0	
.4			
.6			
.8			
1.0			

$\Delta t = .1$

$$\boxed{\Delta y \approx \frac{dy}{dt}\cdot\Delta t}$$

$$\boxed{\frac{dy}{dt} \approx \frac{\Delta y}{\Delta t}}$$

rise ≈ deriv · run

$$\Delta y \approx \frac{dy}{dt}\cdot\Delta t$$

7.5 #2

50 kg $\qquad \frac{kg}{\cancel{L}} \cdot \frac{\cancel{L}}{min}$ ✓

2000 L

.0125 kg/L = conc in

5 L/min ← rate in = rate out

(a) $conc(t=0) = \frac{50}{2000} \frac{kg}{L}$

(b) $x(4\text{ hrs}) = ? = x(240)$

→ $x = x(t)$ = mass of salt in tank at time t

$x(0) = 50$

$$\boxed{\frac{dx}{dt} = \underbrace{.0125 \cdot 5}_{\text{inflow}} - \underbrace{\left(\frac{x}{2000}\right) \cdot 5}_{\text{outflow}}}$$

$$\frac{dx}{dt} = C_{in} \cdot r_{in} - C_{out} \cdot r_{out}$$

$$\left(\frac{x(t)}{V}\right)$$

$$\frac{dx}{dt} = (A - xB)$$

$t = 0$
$x = 50$

$$\int \frac{dx}{A - Bx} = \int dt = t + C$$

$$\boxed{-\frac{1}{B}\ln|A - Bx| = t + C}$$

$x(240)$

$u = A - Bx$
$du = -B\,dx$

$$-\frac{1}{B}\int \frac{du}{u} = -\frac{1}{B}\ln|A - Bx|$$

solve for C

7.6 # 6,7

Notes will follow