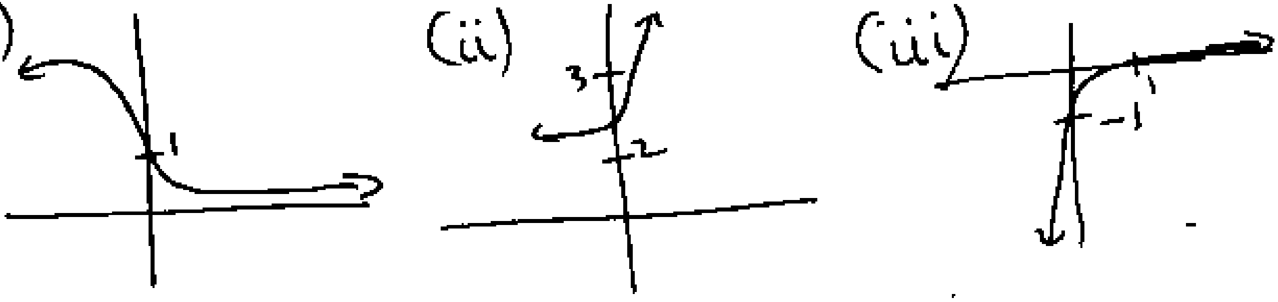
Section 9.2

(2) a) (i) (ii) (iii)



b) for $c \le 2$, $\lim_{t \to \infty} y(t)$ is finite.

equilibrium sol. $\Rightarrow$ $\boxed{y=0,\ y=2}$

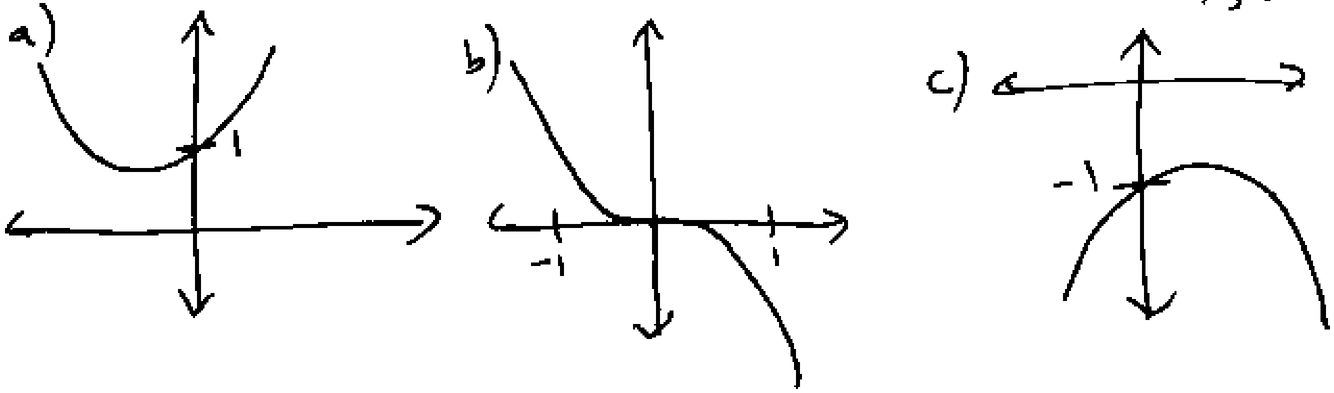
(3) $y' = y - 1$, $\boxed{\text{IV}}$ is the direction field

(4) $y' = y - x = 0$ on line $y = x$, $\boxed{\text{II}}$ is direction field

(5) $y' = y^2 - x^2 = 0$, $\boxed{\text{III}}$ is direction field

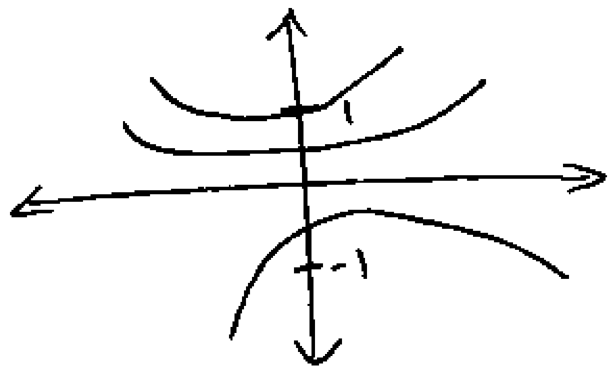
(6) $y' = y^3 - x^3 = 0$ on $y = x$, $\boxed{\text{I}}$ is direction field

(8) a) b) c)



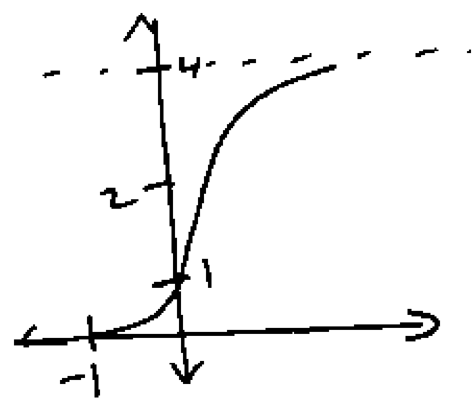
Section 9.2

(10) $y' = xy + y^2$



(14)

x	y	$y' = y(4-y)$
0	0	0
0	1	3
0	-1	-5
0	2	4
0	-2	-12
0	$\frac{1}{2}$	1.75
0	$-\frac{1}{2}$	-2.25
1	0	0
1	1	3
1	2	4
1	-1	-5



(24) a) $h = 0.2$, $x_0 = 0$, $y_0 = 1$, $F(x,y) = 2xy^2$

$y_1 = 1 + 0.2(2 \cdot 0 \cdot 1^2) = 1$, $y_2 = 1 + 0.2(2 \cdot 0.2 \cdot 1^2)$ $\boxed{= 1.08 \simeq y(0.4)}$

We need to find y_2 b/c $x_2 = 0.4$

b) $h = 0.1$, $y_1 = 1 + 0.1(2 \cdot 0 \cdot 1^2) = 1$, $y_2 = 1 + 0.1(2 \cdot .1 \cdot 1^2)$
$= 1.02$

$y_3 = 1.02 + 0.1(2 \cdot 0.2 \cdot 1.02^2) = 1.06162$

$y_4 = 1.06162 + 0.1(2 \cdot 0.3 \cdot 1.06162^2) = \boxed{1.1292 \simeq y(0.4)}$

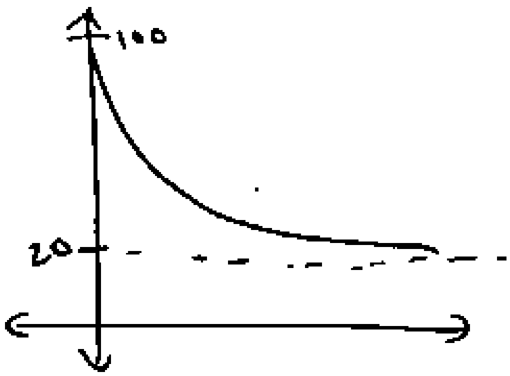
Section 9.2

(28) a) we have $\frac{dy}{dt} = k(y-R)$

$R = 20°C$, $\frac{dy}{dt} = -1°C/min$ when $y = 70°C$

thus, $\frac{dy}{dt} = -\frac{1}{50}(y-20)$

b)



$y_0 = 95$, $t_0 = 0$, $h = 2$

c) $y_1 = y_0 + hF(t_0, y_0) = 95 + 2\left[-\frac{1}{50}(95-20)\right] = 92$

$y_2 = y_1 + hF(t_1, y_1) = 92 + 2\left(-\frac{1}{50}(92-20)\right) = 89.1$

$y_3 = y_2 + hF(t_2, y_2) = 89.1 + 2\left[-\frac{1}{50}(89.1-20)\right] = 86.3$

$y_4 = y_3 + hF(t_3, y_3) = 86.3 + 2\left[\frac{1}{50}(86.3-20)\right] = 83.7$

$y_5 = y_4 + hF(t_4, y_4) = 83.7 + 2\left[\frac{1}{50}(83.7-20)\right] = 81.1$

Thus, $\boxed{y(10) = 81.1°C}$