Yohendi
120040025

CSC4001 Assignment 3

Q1 (1) (1) $b \leq 2$

(2) $b > 2$

(3) $b \leq 2$

(4) $x = 0$

(5) $x = 1$

(6) $x = 0$

(7) $a \leq 3 \;||\; c != 0$

(8) $a > 3 \;\&\&\; c == 0$

(9) $a \leq 3 \;||\; c != 0$

(10) $y = a_0$

(11) $y = a_0$

(12) $y = 2$

(2) $(a_0 > 0) \wedge (b_0 > 2) \wedge ((a_0 > 3) \wedge (c_0 == 0))$

$(a_0 > 0) \wedge (b_0 > 2) \wedge \neg((a_0 > 3) \wedge (c_0 == 0))$

$(a_0 > 0) \wedge \neg(b_0 > 2)$

$\neg(a_0 > 0) \wedge (b_0 > 2) \wedge ((a_0 > 3) \wedge (c_0 == 0))$

$\neg(a_0 > 0) \wedge (b_0 > 2) \wedge \neg((a_0 > 3) \wedge (c_0 == 0))$

$\neg(a_0 > 0) \wedge \neg(b_0 > 2)$

(3)

$a_0 = 4$	$b_0 = 3$	$c_0 = 0$
$a_0 = 1$	$b_0 = 3$	$c_0 = 0$
$a_0 = 1$	$b_0 = 2$	$c_0 = 0$
UNSAT		
$a_0 = 0$	$b_0 = 3$	$c_0 = 0$
$a_0 = 0$	$b_0 = 2$	$c_0 = 0$

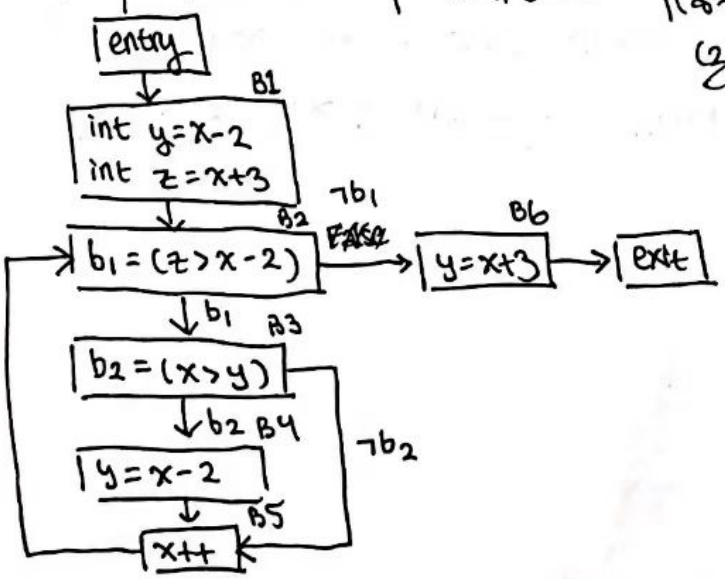
(4) $\left((a_0 > 0) \wedge (b_0 > 2) \wedge ((a_0 > 3) \wedge (c_0 = 0))\right) \vee \underbrace{\left(\neg(a_0 > 0) \wedge (b_0 > 2) \wedge ((a_0 > 3) \wedge (c_0 = 0))\right)}_{\text{impossible case}}$

$\equiv (a_0 > 0) \wedge (b_0 > 2) \wedge ((a_0 > 3) \wedge (c_0 = 0))$

(5)

line	concrete state	symbolic state	path condition
5	$a=4, b=3, c=0$	$a=a_0, b=b_0, c=c_0$	N/A
13	$x=0, y=1$	$x=0, y=1$	$a_0 > 0$
16	$x=1, y=1$	$x=1, y=1$	$b_0 > 2$
24	$x=1, y=4$	$x=1, y=a_0$	$(a_0 > 3) \wedge (c_0 = 0)$

Q2 (1)



(2) gen $B_1 = \{y = x-2, z = x+3\}$

kill $B_1 = \{y = x-2, y = x+3\}$

gen $B_2 = \{\}$

kill $B_2 = \{\}$

gen $B_3 = \{\}$

kill $B_3 = \{\}$

gen $B_4 = \{y = x-2\}$

kill $B_4 = \{y = x-2, y = x+3\}$

Q2(2) $gen_{B_1} = \{x-2, x+3\}$

$kill_{B_1} = \{\}$

$gen_{B_2} = \{\}$

$kill_{B_2} = \{\}$

$gen_{B_3} = \{\}$

$kill_{B_3} = \{\}$

$gen_{B_4} = \{x-2\}$

$kill_{B_4} = \{\}$

$gen_{B_5} = \{x+1\}$

$kill_{B_5} = \{x-2, x+3\}$

$gen_{B_6} = \{x+3\}$

$kill_{B_6} = \{\}$

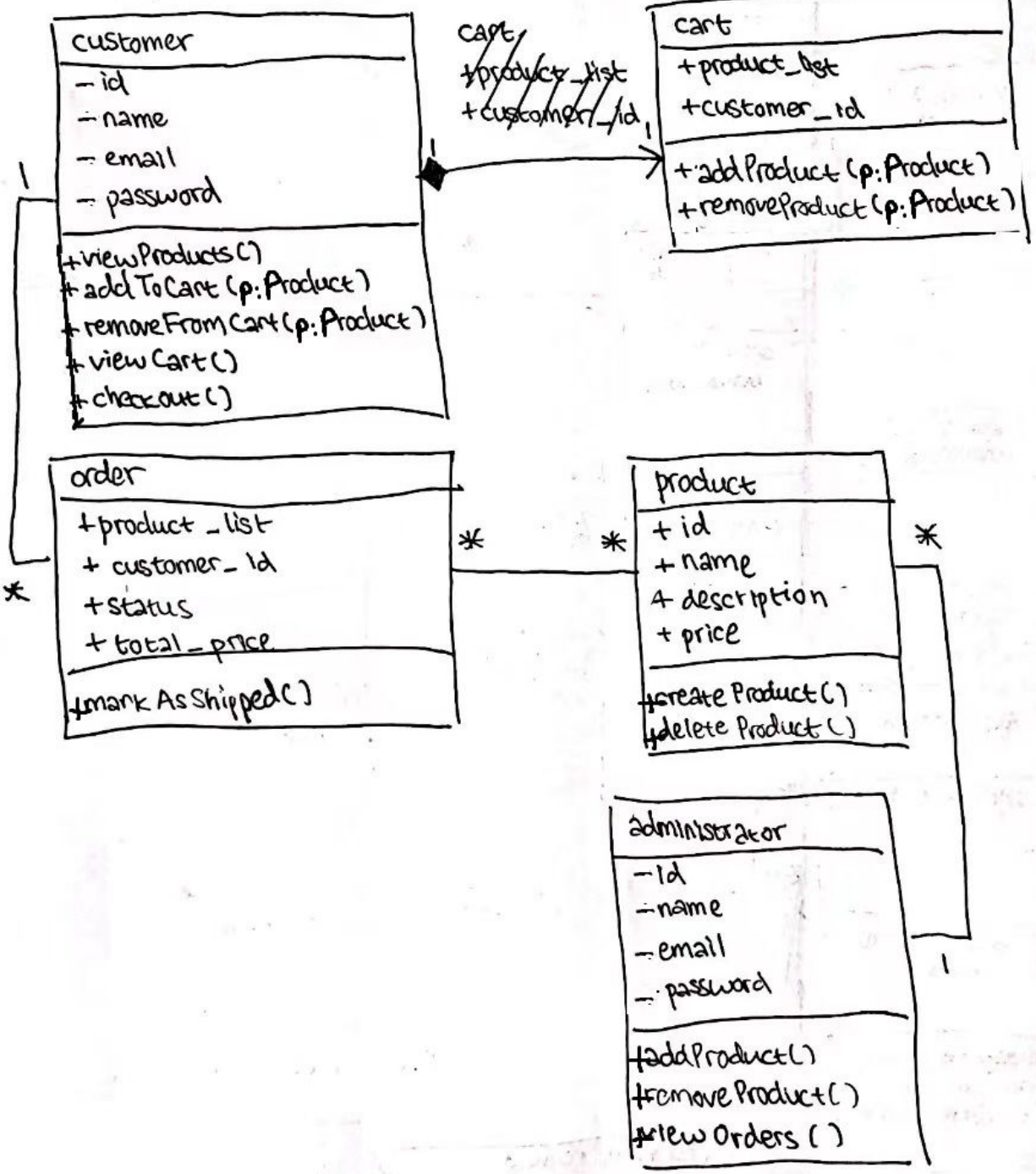
(3)

Iteration 1	Iteration 2	Iteration 3 (converged)
$OUT[B_1] = \{x-2, x+3\}$	$OUT[B_1] = \{x-2, x+3\}$	$OUT[B_1] = \{x-2, x+3\}$
$OUT[B_2] = \{x-2, x+3\}$	$OUT[B_2] = \{\}$	$OUT[B_2] = \{\}$
$OUT[B_3] = \{x-2, x+3\}$	$OUT[B_3] = \{\}$	$OUT[B_3] = \{\}$
$OUT[B_4] = \{x-2, x+3\}$	$OUT[B_4] = \{x-2\}$	$OUT[B_4] = \{x-2\}$
$OUT[B_5] = \{x+1\}$	$OUT[B_5] = \{x+1\}$	$OUT[B_5] = \{x+1\}$
$OUT[B_6] = \{x-2, x+3\}$	$OUT[B_6] = \{x+3\}$	$OUT[B_6] = \{x+3\}$

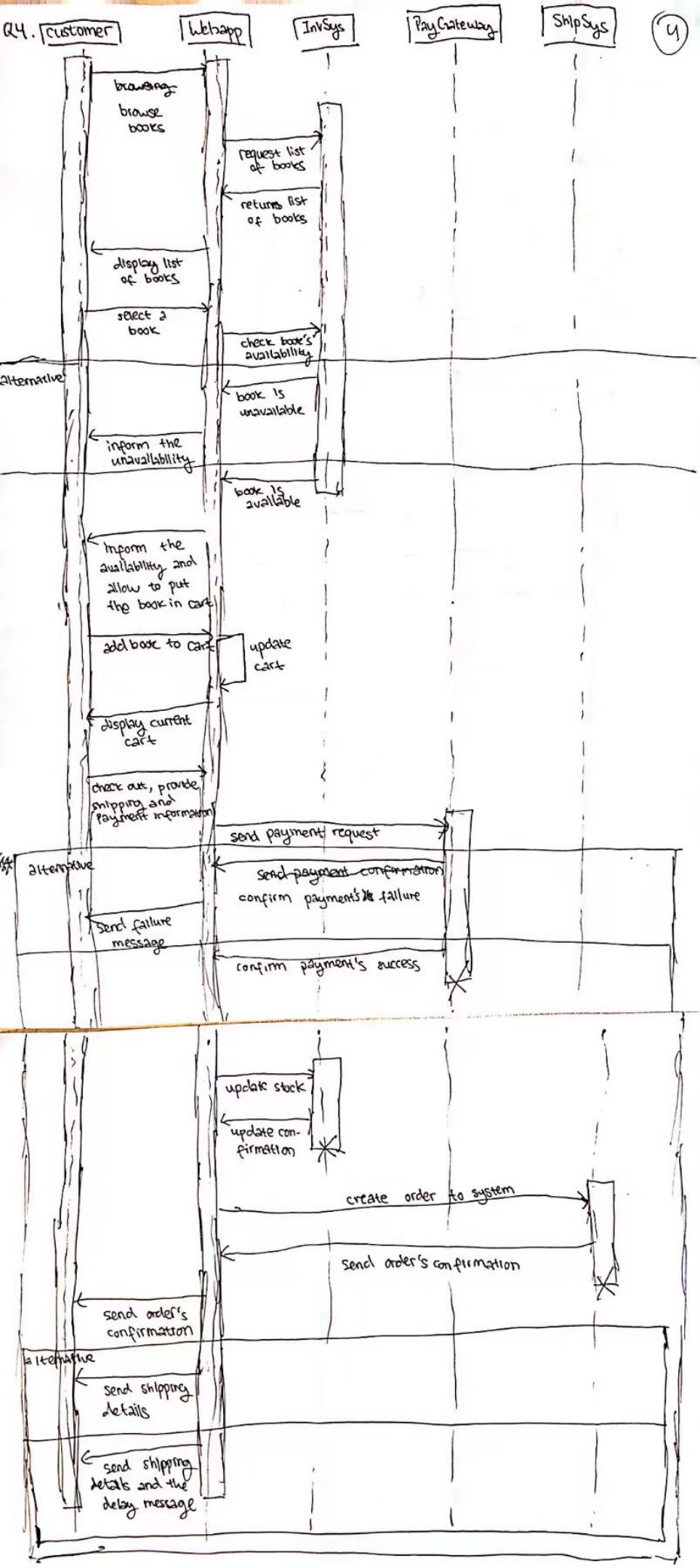
Q3.

customer
+ customer ID
+ name
+ address

customer
+ customer_id
+



Q4.


Customer
Webapp
InvSys
PayGateway
ShipSys
browse books
request list of books
returns list of books
display list of books
select a book
check book's availability
alternative
book is unavailable
inform the unavailability
book is available
inform the availability and allow to put the book in cart
add book to cart
update cart
display current cart
check out, provide shipping and payment information
send payment request
alternative
send payment confirmation
confirm payment's failure
send failure message
confirm payment's success
update stock
update confirmation
create order to system
send order's confirmation
send order's confirmation
alternative
send shipping details
send shipping details and the delay message