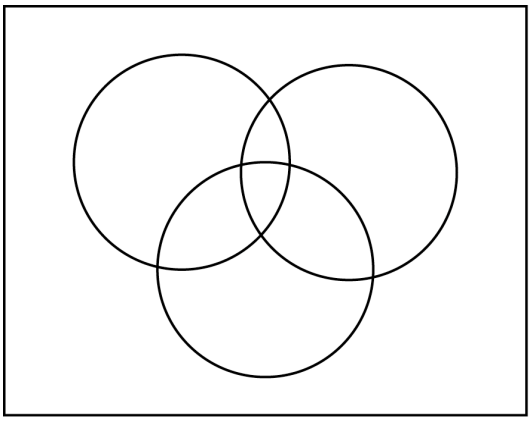
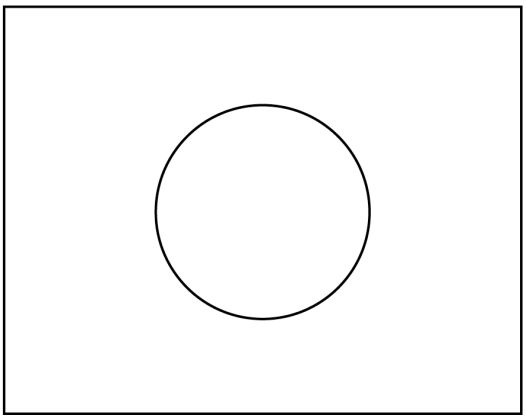
22.38 PROBABILITY AND ITS APPLICATIONS TO RELIABILITY, QUALITY CONTROL AND RISK ASSESSMENT

Fall 2005

COMPARE FLIGHT CASES A, B



Case A
Three Independent Flights



Case B
All Three Persons Fly Together

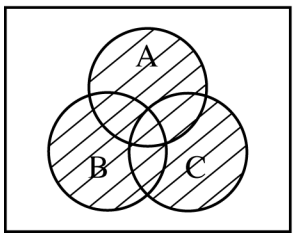
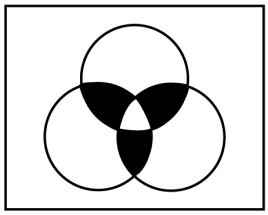
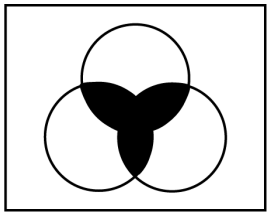
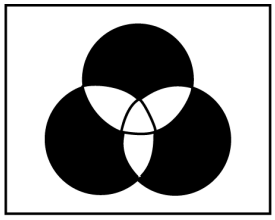
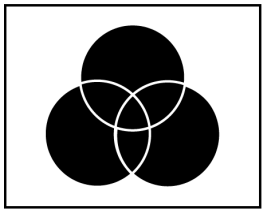
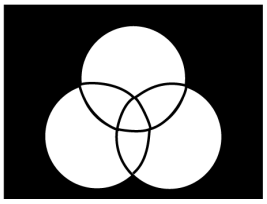
Outcome:

All Survive	p^3	<	p
None Survive	q^3	<	q
At Least One is Lost	$3pq + q^3$	>	q

Prob.(Success) = p

Prof.(Failure) = q

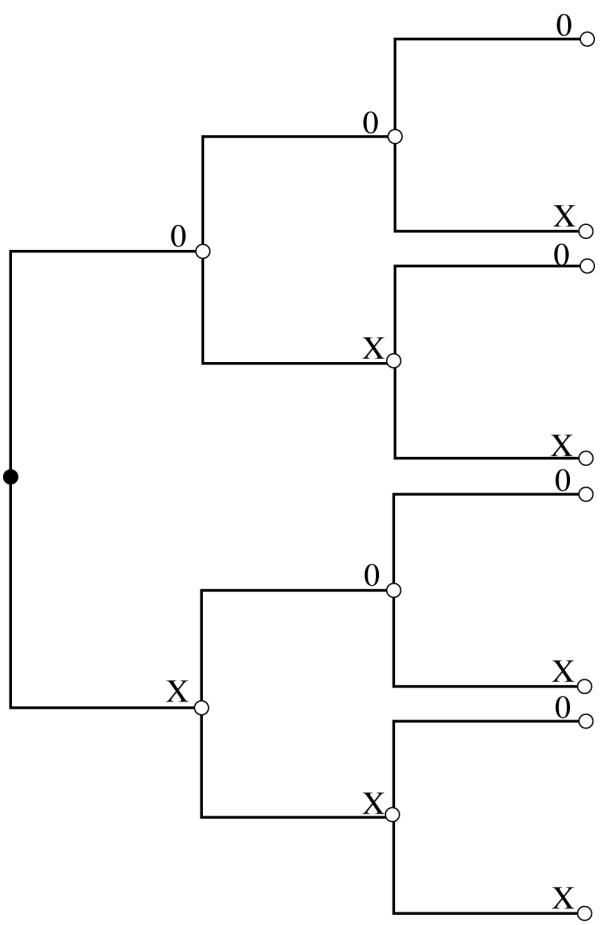
COMPARE CASES A → C

Outcome	Probability by Case A (three independent flights)	B (all three persons fly together)	C (one person flies three times, if possible)
All Survive 	p^3	p	p^3
Two Survive 	$3p^2q$	0	$q[p^2 + p + 1]$
Two or More Survive 	$3p^2q + p^3$	p	1
One Survives 	$3pq^2$	0	0
One or More Survives 	1 - P(0,3) $1 - q^3$	p	1
None Survive 	q^3	q	0

EVENT TREES

Outcomes: x ⇒ success, prob. = p
0 ⇒ failure, prob. = q

Case A
(three children travel separately)



Case B
(all three children travel together)

Case C
(one child travels three times)