8: Modern fighter planes are flown by computers. In order to make the plane more immune to computer failure, three computers are used so that if one goes bad and disagrees with the other two, it will be ignored. Thus a plane will crash due to computer failure only if two or more of the three computers fail. Suppose the computers fail independently and with the ~~same~~ same probability per flight, p. Derive an expression giving the probability a fighter plane crashes due to computer failure on its next flight in terms of p.

$P(\text{"2 or more"})$

$= P(\text{"2"} \cup \text{"3"})$

$= P(\text{"2"}) + P(\text{"3"})$ $\equiv 2$

$= P(ggf) + P(fgf) + P(ffg) + P(fff)$ ~~$\equiv 2$~~

$= 3p^2(1-p) + p^3$ ~~$\equiv 1$~~

or $P(\text{"2 or more"}) = 1 - P(\text{"1 or 0"})$

$= 1 - [P(\text{"1"}) + P(\text{"0"})]$

$= 1 - [P(ggf) + P(gfg) + P(fgg) + P(ggg)]$

$= 1 - 3p(1-p)^2 - (1-p)^3$