30. number of zinfandel bottles, $z = 8$

a. number of merlot bottles, $M = 10$
number of cabernet bottles, $C = 12$

$n = 8$, $r = 3$ → $\frac{n!}{(n-r)!}$ → $\frac{8!}{(8-3)!}$ → $\frac{8\times7\times6\times5\times4\times3\times2\times1}{5!} = 8\times7\times6 = \boxed{336}$

b. $\frac{30!}{6!\times24!} = \frac{30\times29\times28\times27\times26\times25}{720} = \boxed{593775}$

c. $\frac{8!}{2!(8-2)!} \times \frac{10!}{2!(10-2)!} \times \frac{12!}{2!(12-2)!} = \frac{8!}{2!\times6!} \times \frac{10!}{2!\times8!} \times \frac{12!}{2!\times10!} \rightarrow \frac{1}{2!\times6!} \times \frac{1}{2!} \times \frac{12!}{2!}$

$= 83160$

D. $83160 / 593775 = 0.1401$

E. $\binom{12}{6} + \binom{8}{6} + \binom{10}{6} = \frac{724+28+210}{593775} = \frac{1162}{593775} = 0.001957 =$

$\boxed{.02}$

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32. a. $\binom{5}{1}\binom{4}{1}\binom{3}{1}\binom{4}{1} = 5\times4\times3\times4 = \boxed{240}$ ways to select one component of each type

b. $\binom{1}{1}\binom{1}{1}\binom{3}{1}\binom{4}{1} = 1\times1\times3\times4 = \boxed{12}$ ways to select components with the receiver and compact disk players are to be of Sony type

c. $\binom{4}{1}\binom{3}{1}\binom{3}{1}\binom{3}{1} = 4\times3\times3\times3 = \boxed{108}$ ways when no Sony brand is selected

D. n(total number of selections) − n(number of solutions without Sony brand) $= 240 - 108$

$= \boxed{132}$ ways of solution if at least one Sony component is to be included

e. p(At least one Sony component) = $\frac{n(\text{selections with at least one Sony component})}{n(\text{total number of selections})}$

probability that system selected contains at least one Sony components $= \frac{132}{240} = \boxed{0.55}$

Probability that system selected contains exactly one Sony components is : $\boxed{0.4125}$