12pts) 3. Phil's Fresh Fish Friends store sells 18 different kids of fish. For each part below, include the answer and a very brief explanation of why your answer is correct.

(Hint: no two answers on this page will be the same.)

(a) How many different purchases can you make if you want 6 unique fish to put in one big tank?

$\binom{18}{6}$ this is correct because you want each combination without any repeats.

18,564

(b) You decide you don't care if all of the fish are different. How many ways can you buy 6 (not necessarily unique) fish to put in one big tank?

$\binom{23}{5}$ or $\binom{23}{18}$

33,649 Stars and bars 18 possibilities for each fish

(c) You remember you already have 6 fish bowls (all different sizes and shapes) at home already and don't need to buy a new tank. How many ways can you buy 6 unique fish and arrange them in the different tanks?

$P(18,6)$ this is correct because we need unique combos and we get that from permutations

13,366,080

(d) You remember that you don't care if the fish are different anymore. How many ways can you purchase 6 fish, not necessarily unique, to put in the 6 very unique fish bowls?

18^6 for each of 6 fish, there are 18 options