Problem 1: Let $X = \{a, b, c\}$, $Y = \{a, d, e, f\}$, and $Z = \{f, g\}$. List all elements of the following sets:

$$X \cup Y \cup Z =$$

$$X \cap Y =$$

$$(Y - X) - Z =$$

$$X \times X =$$

$$\mathcal{P}(Z) =$$

Note: $\mathcal{P}(Z)$ denotes the power set of $Z$. 

CS111-W11 QUIZ 1a, January 11, 9:10-9:30AM
Problem 2: Let $f, g : \mathbb{R} \to \mathbb{R}$ be the functions given by $f(x) = 2x - 3$, and $g(x) = x^3 + 1$. Give the formulas for the following functions:

\[
\begin{align*}
 f \circ g(x) &= \\
g \circ f(x) &= \\
g \circ g(x) &= \\
f^{-1}(x) &= \\
g^{-1}(x) &= \\
\end{align*}
\]

Note: $f \circ g$ is the composition of $g$ and $f$, that is $f \circ g(x) = f(g(x))$, and $f^{-1}$ is the inverse of $f$. 
Problem 3: Let $X$ be a set of 10 distinct items. Give formulas for the following quantities (you do not have to compute the value.)

(a) What is the total number of subsets of $X$?

(b) In how many ways we can choose 6 items from $X$ if the items in the choices are ordered and repetition is not allowed?

(c) In how many ways we can choose 6 items from $X$ if the items in the choices are ordered and repetition is allowed?

(d) In how many ways we can choose 6 items from $X$ if the items in the choices are not ordered and repetition is not allowed?

(e) In how many ways we can order $X$?