Let \( A = \) parts with paint defect  
\( B = \) parts with packaging defect  
\( C = \) parts with electronic defect  
Then \(|A| = 28, |B| = 17, |C| = 13, |A \cap B| = 6, |B \cap C| = 7, |A \cap C| = 10.\)  
\( 40 = 28 + 17 + 13 - 6 - 7 - 10 + |A \cap B \cap C|, \) so \( |A \cap B \cap C| = 5; \) 5 parts had all three types of defect.

Let \( A = \) checking account set, \( B = \) regular savings set, \( C = \) money market savings set.  
a. \(|A \cap C| = 93.\)  
b. \(|A - (B \cup C)| = |A| - |A \cap (B \cup C)|\) by Example 29  
\[ = |A| - |(A \cap B) \cup (A \cap C)| \]
\[ = |A| - |(A \cap B) + (A \cap C)|\] by Example 28 because \((A \cap B)\) and \((A \cap C)\) are disjoint  
\[ = 189 - (69 + 93) = 27\]

(Use the Pigeonhole Principle, where suits are bins, cards are items)  
3; there are two genders (bins).

This follows from the Pigeonhole Principle, where the \( n \) possible remainders (the numbers 0 through \( n - 1 \)) are the bins.

19!

\( C(18, 11) \)

\( C(32, 14) \)

\( C(43, 14) \)

\( \frac{12!}{5!3!4!} \)

\( a. \) \( C(10, 8) \)  
\( b. \) \( C(7, 5) \) (3 of the 8 objects are fixed, choose the remaining 5 from among 3, with repetitions)  
\( c. \) \( C(9, 8) \) (choose 8 from 2 with repetitions)  
\( d. \) \( C(8, 6) \) (2 of the 8 objects are fixed, choose the remaining 6 from among 3, with repetitions)  
\( e. \) \( C(9, 8) + C(8, 7) + C(7, 6) \) (zero chocolate chip cookies used - choose 8 from 2 with repetitions) + (one chocolate chip cookie used - choose remaining 7 from among 2 with repetitions) + (two chocolate chip cookies used - choose remaining 6 from among 2 with repetitions)

729x^6

From the Binomial Theorem with \( a = 1, b = -1: \)
\( C(n, 0) - C(n,1) + C(n,2) - ... + (-1)^n C(n,n) = (1 + (-1))^n = 0^n = 0 \)