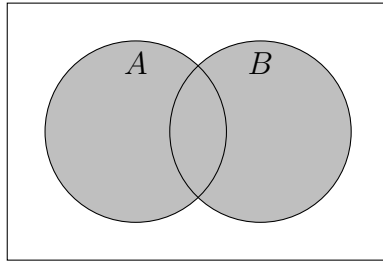
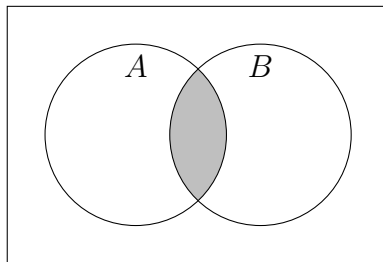


1. For each Venn diagram, write an expression representing the shaded area.

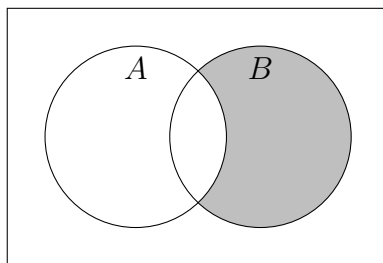
(a) For example, for this diagram



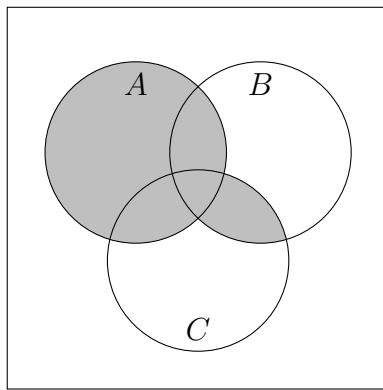
Expression:



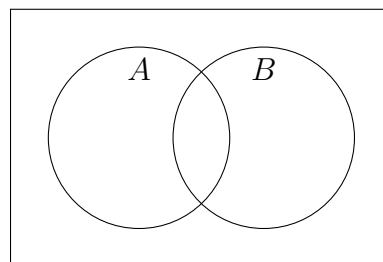
(b) Expression:



(c) Expression:



(d) Expression:



2. Shade the area representing  $A' \cap B'$

3. Given:

$$A = \{a, b, c, d, e\} \quad B = \{a, e, i, o, u\}$$

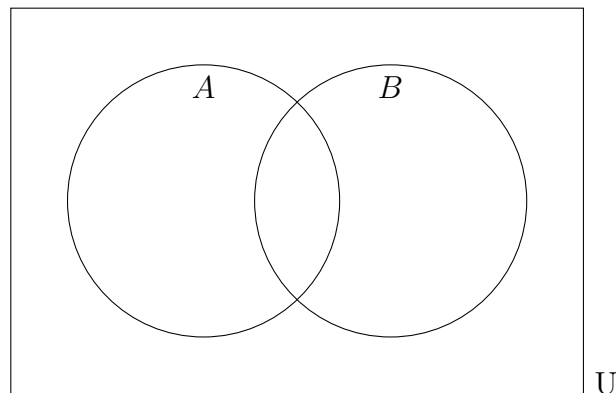
(a) What is  $A \cup B$ ?

(b) What is  $A \cap B$ ?

4. Suppose there are 19 species of fruit-eating monkeys in the western hemisphere. Their diets are as follows:

- 16 species of monkeys eat bananas
- 12 species eat apples
- 11 eat both apples and bananas

Complete the Venn diagram below, writing the number of species of fruit-eating monkeys in each region to represent the situation. (Use “A” for apple, “B” for banana)



How species have a diet that does not include apples nor bananas?

5. A survey question has three possible responses,  $A$ ,  $B$ , and  $C$ . Among 100 surveys, the frequencies of the answers collected were  $n(A) = 40$ ,  $n(B) = 35$ , and  $n(C) = 25$ .

(a) If a survey is selected at random, what this the probability the response was  $B$ ?

(b) What is the probability a survey selected at random was an answer other than  $C$ ?

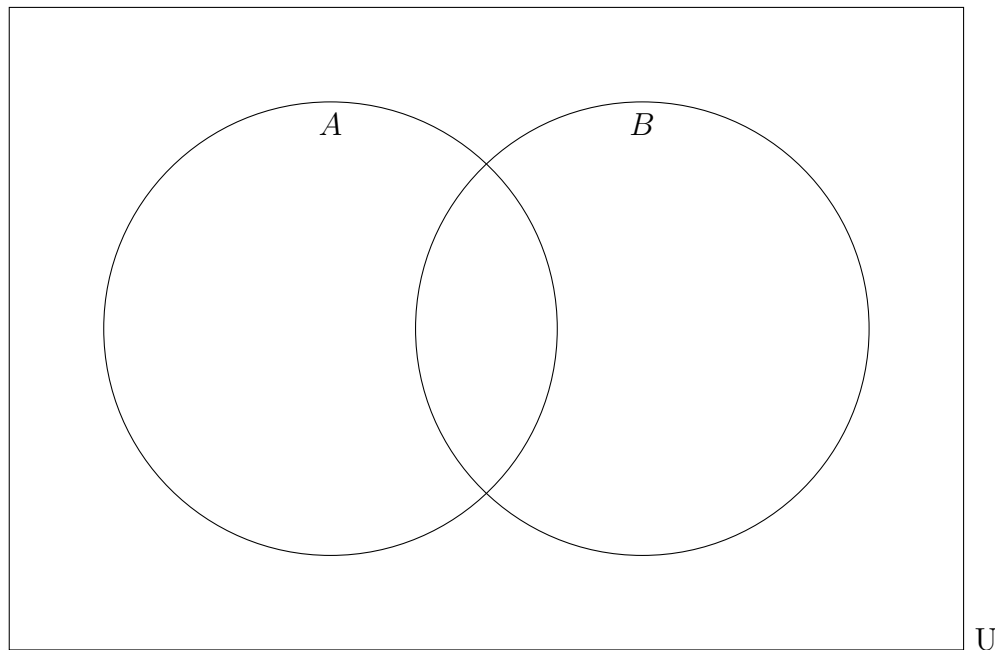
6. The universal set  $U$  is defined as the set of positive integers less than 13. The subsets  $A$  and  $B$  are defined as follows:

$A = \{\text{integers that are multiples of 3}\}$

$B = \{\text{prime numbers}\}$

(note: Prime numbers have only themselves and one as factors. One is not considered a prime.)

- (a) List the members of  $A$
- (b) List the members of  $B$
- (c) Place the elements of  $A$  and  $B$  in the appropriate regions in the Venn diagram below.



- (d) List the items in the set  $(A \cup B)'$
- (e) If an element is selected at random, what is the probability that it is a member of the set  $A \cap B$ ?

7. Let  $f(x) = x^2 + x - 2$  and  $g(x) = x + 2$

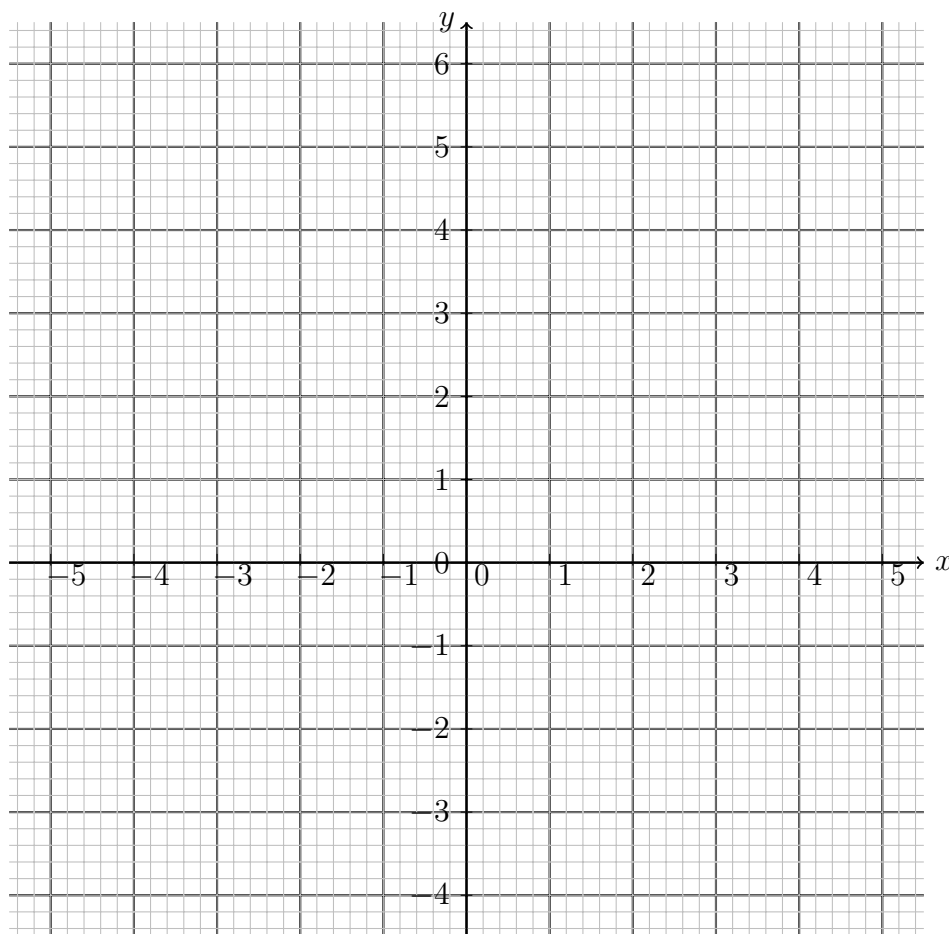
(a) Rewrite  $f$  in vertex form and state the vertex as an ordered pair.

(b) Factor the function  $f$  and write down its roots.

(c) Graph the function  $f$ , labeling it. Mark the intercepts and graph the axis of symmetry as a dotted line, labeling it with its equation.

(d) Graph  $g$  and label it with its name or equation.

(e) Mark the intersections of  $f$  and  $g$  as ordered pairs.



Simplify, leaving no negative or fractional exponents.

8.  $2x^{-3}y \times \frac{1}{4}x^2y^{-1}$

9.  $a^{\frac{3}{4}} \times \left(\frac{\sqrt{a}}{b^4}\right)^{\frac{1}{2}}$

10.  $\ln e^4$

11.  $\log 5^2 + \log 4$

12.  $(2x^2 - x - 5)(x - 3) - (x^2 + 3x - 5)(2x - 3)$

13. Factor the expression and then solve for  $x$ :  $2x^3 - 2x^2 - 24x = 0$

14. Let  $f(x) = 2x - 5$  and  $g(x) = (x - 1)^2$

(a) Find  $(f \circ g)(x)$

(b) Find  $f^{-1}(x)$

15. The function  $f(x) = e^x$  is shown on the graph. Sketch  $g(x) = f(x - 2) + 3$ . Plot and label the asymptote(s).

