

# 1 Week 15 HOGU: 6.2, Final Exam Review Part 2

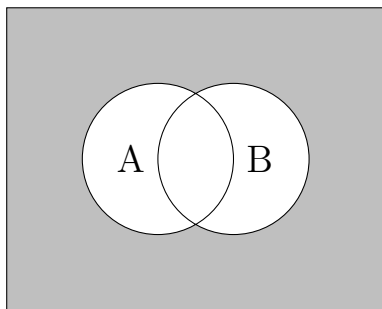
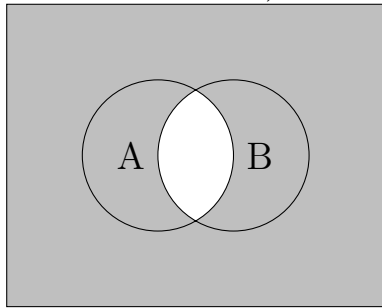
**Problem 1.** The John Weeks Enterprise is booming! The business needs to save up \$150,000 for a planned expansion. They make an initial deposit of \$25,000 and plan on depositing \$500 at the end of each month in T-bills, which currently yield 5.16% APR. Say that interest in these T-bills is compounded monthly. How many years will it take the John Weeks Enterprise to save up the \$150,000 they need?

**Problem 2.** You are building the boat “Sailing for Weeks”, which will currently cost \$44,750 to craft. You make a down payment of \$10,000 and finance the rest with a 10-year loan. The loan charges 7% interest, compounded quarterly.

- (a) After making quarterly payments on the boat for 3 years, how much of the principal of your loan is still unpaid?

- (b) After 3 years on your old loan above, you find a loan company that will refinance your loan at an APR of 5%, compounded quarterly, with a payment schedule that has you paying off the loan in 5 years! You decide to refinance your purchase and to make quarterly payments on the new loan. How much will your quarterly payments be?

**Problem 3.** Using union, intersection, and complements, how would you describe the shaded-in regions of these Venn diagram? (There is more than one correct answer.)



**Problem 4.** The following is a probability distribution with a missing entry:

Outcome	1	2	3	4	5
Probability	$\frac{18}{100}$	$\frac{23}{100}$		$\frac{9}{100}$	$\frac{33}{100}$

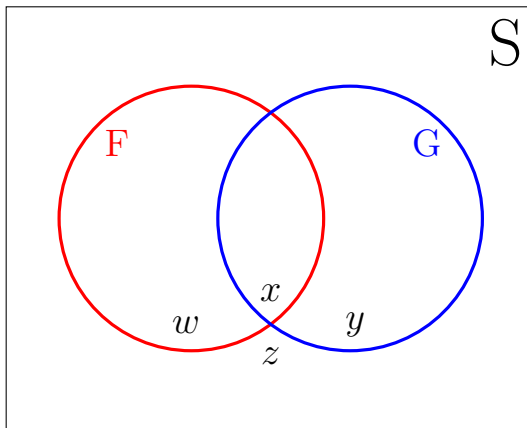
Let  $A = \{1, 3, 5\}$  and let  $B = \{2, 4, 5\}$ . What is  $P(A \cup B^C)$ ?

**Problem 5.** Given that  $F$  and  $G$  are two events of an experiment with  $P(F) = 0.4$ ,  $P(G) = 0.5$ , and  $P(F \cap G) = 0.2$ , calculate the following probabilities:

(a)  $P(F^C)$

(b)  $P(F \cup G)$

(c)  $P(F \cup G^C)$  (You may find the Venn diagram below helpful!)



**Problem 6.** A local group is sponsoring a game at the Renaissance Fair! A foolish jester asks you to pay \$1 to play the game, then flips a fair two-sided coin. As it is in the air, the player calls “heads” or “tails”. If the coin lands on the side the player called out, they win \$5! Otherwise, the player wins nothing.

- (a) Let  $X$  be the amount of *net winnings*, in dollars, that a player makes from playing this game. Write a probability distribution for  $X$ .

- (b) What is the expected amount of net winnings for the player? Is this a fair game?

**Problem 7.** Compute the domain of the following functions. Then state all holes and vertical asymptotes of the function. (Remember that, for holes, you must give an  $x$ - and  $y$ -coordinate. Write your answer as  $(x, y)$ .)

$$(a) f(x) = \frac{(x+3)^2}{(x-1)^2(x+3)}$$

$$(b) f(x) = \frac{(x+3)}{(x-1)^2(x+3)^2}$$

**Problem 8.** Find the domain of the following function:

$$f(x) = \begin{cases} \ln(-x) & \text{if } x \leq 2 \\ \sqrt{4-x} & \text{if } x > 3 \end{cases}$$



**Problem 9.** Solve the equation  $e^{4x} = 5e^{7x}$  for  $x$ .

**Problem 10.** Write the expression  $\frac{1}{3}\ln(x) - \ln(x + y) + 4\ln(2z)$  as a single logarithm. Assume all variables represent positive numbers.