

Name: _____

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In all questions, “ $Pr(x)$ ” stands for “the probability of x ”.

Problem 1

- (a) (2 pts) If $Pr(j) = .5$, then $Pr(\sim(j \vee \sim j)) =$ _____.
- (b) (2 pts) If $Pr(t) = .8$, then $Pr(t \vee \sim t) =$ _____.
- (c) (2 pts) If $Pr(p) = .4$, then $Pr(\sim p \ \& \ p) =$ _____.
- (d) (2 pts) If $Pr(r) = .6$, then $Pr(\sim \sim r) =$ _____.
- (e) (2 pts) If $Pr(w) = .3$, then $Pr(w \vee w) =$ _____.

Problem 2

For these questions, either calculate the desired probability, or state that not enough information is present.

- (a) (5 pts) If $Pr(h) = .4$ and $Pr(f) = .3$, then what is $Pr(\sim h \vee f)$?
- (b) (5 pts) If $Pr(t) = .6$ and $Pr(t \vee n) = .8$, then what is $Pr(t \ \& \ n)$?
- (c) (5 pts) If $Pr(d) = .5$ and $Pr(c \vee d) = .7$, then what is $Pr(c)$?
- (d) (5 pts) If $Pr(s) = .5$ and $Pr(l) = .4$ and $Pr(\sim s \ \& \ l) = .2$, then what is $Pr(s \vee l)$?
- (e) (5 pts) If $Pr(b) = .6$ and $Pr(\sim b \vee y) = .5$, then what is $Pr(b \ \& \ y)$?

Problem 3

Assume that $Pr(v) = .6$, $Pr(g \mid v) = 1/3$, and $Pr(g \mid \sim v) = 3/4$

- (a) (5 pts) $Pr(v \ \& \ g) =$ _____.
- (b) (5 pts) $Pr(v \ \& \ \sim g) =$ _____.
- (c) (5 pts) $Pr(\sim v \ \& \ g) =$ _____.
- (d) (5 pts) $Pr(g) =$ _____.
- (e) (5 pts) $Pr(\sim g) =$ _____.
- (f) (5 pts) $Pr(v \mid \sim g) =$ _____.

Problem 4

- (a) (5 pts) If x and y are probabilistically independent, and $Pr(x) = 1/3$ and $Pr(y) = 1/2$, then

$$Pr(x \& y) = \underline{\hspace{2cm}}.$$

- (b) (5 pts) If $\sim p$ and $\sim q$ are probabilistically independent, and $Pr(\sim p) = 1/4$ and $Pr(\sim q) = 1/2$, then

$$Pr(\sim p \& \sim q) = \underline{\hspace{2cm}}.$$

- (c) (5 pts) If $Pr(d) = 1/4$ and $Pr(k) = 1/4$, and $Pr(d \& k) = 1/8$, are d and k probabilistically independent?

- (d) (5 pts) If $Pr(r) = 1/2$ and $Pr(s) = 1/3$, and $Pr(r \& s) = 1/6$, are r and s probabilistically independent?

Problem 5

Consider the following probability distribution:

x	y	z	Pr
T	T	T	.2
T	T	F	.2
T	F	T	.1
T	F	F	.1
F	T	T	.1
F	T	F	.1
F	F	T	.1
F	F	F	.1

- (a) (5 pts) What is the expected value of a gamble that pays +5 if x is true and -5 otherwise?
- (b) (5 pts) What is the expected value of a gamble that pays +5 if $x \& \sim y$ is true and -10 otherwise?
- (c) (5 pts) What is the expected value of a gamble that pays +2 if $y \vee z$ is true and -5 otherwise?