**1-4.** The table below cross-classifies patients by sex and treatment type. We will select a patient at random (with equal probability).

| sex \ treatment | 1 | 2 | 3 | **totals** |
|---|---|---|---|---|
| male | 22 | 31 | 28 | **81*** |
| female | 42 | 34 | 33 | **109** |
| **totals** | **64** | **65** | **61** | **190** |

**There was a typo that did not affect formal answers, 81 was typed 71.*

**1. Determine P(male).**

a) 22/64 b) 22/81 c) 64/190 d) 22/190 e) 81/190

| | 1 | 2 | 3 | 4 | 5* | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 0 | 0 | 0 | 0 | 100 | 0 | DIFF | 0 |
| L | 0 | 0 | 0 | 0 | 100 | 0 | DISC | 0 |

**2. Determine P(male $\cap_{and}$ treatment 1).**

a) 22/64 b) 22/81 c) 64/190 d) 22/190 e) 81/190

| | 1 | 2 | 3 | 4* | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 0 | 0 | 0 | 100 | 0 | 0 | DIFF | 14 |
| L | 19 | 11 | 0 | 67 | 4 | 0 | DISC | 33 |

**3. Determine P(treatment 1 $|_{if}$ male).**

a) 22/64 b) 22/81 c) 64/190 d) 22/190 e) 81/190

| | 1 | 2* | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 4 | 96 | 0 | 0 | 0 | 0 | DIFF | 20 |
| L | 33 | 63 | 0 | 4 | 0 | 0 | DISC | 33 |

**4.** Is sex **independent** of treatment level for this table?
a) yes  b) no

| | 1 | 2* | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 48 | 48 | 0 | 0 | 0 | 4 | DIFF | 62 |
| L | 81 | 19 | 0 | 0 | 0 | 0 | DISC | 30 |

**5-8.** A box has colored balls [ 8R  6G  2Y ].
**5.** Selections will be made **without replacement** and with equal probability on those remaining in the box at each successive draw. **Determine $P(Y2\ |_{if}\ G1)$.**
a) 2/16  b) 2/15  c) 1/16  d) 1/15

| | 1 | 2* | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 0 | 100 | 0 | 0 | 0 | 0 | DIFF | 12 |
| L | 7 | 70 | 7 | 15 | 0 | 0 | DISC | 30 |

**6.** Selections will be made **without replacement** and with equal probability on those remaining in the box at each successive draw. **Determine $P(Y2)$.**
a) 2/16  b) 2/15  c) 1/16  d) 1/15

| | 1* | 2 | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 59 | 30 | 0 | 11 | 0 | 0 | DIFF | 59 |
| L | 37 | 41 | 11 | 11 | 0 | 0 | DISC | 22 |

**7.** Insead, selections will be made **with replacement** and with equal probability on those remaining in the box at each successive draw. **Determine $P(Y2\ |_{if}\ G1)$.**
a) 2/16  b) 2/15  c) 1/16  d) 1/15

| | 1* | 2 | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 100 | 0 | 0 | 0 | 0 | 0 | DIFF | 12 |
| L | 74 | 4 | 19 | 4 | 0 | 0 | DISC | 26 |

**8.** Which are correct?

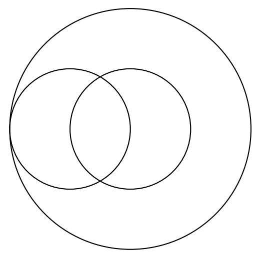
When sampling **without** replacement events G1, Y2 are **independent.**

When sampling **with** replacement events G1, Y2 are **independent.**

a) both (are correct) b) only the first c) only the second d) neither

| | 1 | 2 | 3* | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 0 | 15 | 85 | 0 | 0 | 0 | DIFF | 35 |
| L | 19 | 30 | 41 | 11 | 0 | 0 | DISC | 44 |

**9-11.** P(rain Saturday) = 0.8
P(rain Sunday) = 0.7
P(rain both days) = 0.6



**9. Determine P(rain Saturday and not rain Sunday)**.

a) 0.2 b) 0.1 c) 0.3 d) 0.24 e) 0.9

| | 1* | 2 | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 78 | 0 | 0 | 22 | 0 | 0 | DIFF | 41 |
| L | 30 | 22 | 15 | 30 | 4 | 0 | DISC | 48 |

**10. Determine P(rain Saturday $\bigcup_{\text{or}}$ rain Sunday).**

a) 0.2 b) 0.1 c) 0.3 d) 0.24 e) 0.9

| | 1 | 2 | 3 | 4 | 5* | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 0 | 4 | 7 | 0 | 89 | 0 | DIFF | 24 |
| L | 4 | 15 | 30 | 0 | 52 | 0 | DISC | 37 |

**11.** Are the **events** "rain Saturday" and "rain Sunday" **independent**?
a) yes, independent  b) no, not independent

| | 1 | 2* | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 22 | 78 | 0 | 0 | 0 | 0 | DIFF | 36 |
| L | 56 | 44 | 0 | 0 | 0 | 0 | DISC | 33 |

**12-14.** Use notation "OIL+" for "OIL$\cap_{\text{and}}$ +" etc. We are given:

P(OIL +) = 0.3  P(OIL -) = 0.2
P(noOIL +) = 0.1  P(noOIL -) = 0.4

**12.** Determine **P(OIL)**.
a) 0.75  b) 0.33  c) 0.25  d) 0.6  e) 0.5

| | 1 | 2 | 3 | 4 | 5* | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 0 | 0 | 0 | 0 | 100 | 0 | DIFF | 17 |
| L | 7 | 0 | 11 | 19 | 63 | 0 | DISC | 37 |

**13.** Determine **P(+ $|_{\text{if}}$ OIL).**
a) 0.75  b) 0.33  c) 0.25  d) 0.6  e) 0.5

| | 1 | 2 | 3 | 4* | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 4 | 0 | 0 | 96 | 0 | 0 | DIFF | 32 |
| L | 11 | 30 | 11 | 41 | 7 | 0 | DISC | 56 |

**14.** Determine **P(OIL $|_{\text{if}}$ +)** (its Bayes, but just use the definition).
a) 0.75  b) 0.33  c) 0.25  d) 0.6  e) 0.5

| | 1* | 2 | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 78 | 4 | 4 | 11 | 4 | 0 | DIFF | 53 |
| L | 26 | 7 | 7 | 30 | 30 | 0 | DISC | 52 |

## 15-18. Classical probabilities.

**15.** 40% of students in a class are "from Michigan." Of these, 50% are men. What percentage of students in the class are "men from Michigan?"
a) 10% b) 20% c) 30% d) 40% e) 50%

| | 1 | 2* | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 0 | 96 | 0 | 0 | 4 | 0 | DIFF | 5 |
| L | 0 | 89 | 0 | 0 | 11 | 0 | DISC | 7 |

**16.** A red die has faces numbered {1, 1, 2, 2, 5, 5}. A green die has the usual numbering {1, 2, 3, 4, 5, 6}. When the two dice are thrown what is the classical probability P(R > G) (red **strictly larger** than green).

| red \ green | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 2 | | | | | | |
| 5 | | | | | | |
| 5 | | | | | | |

a) 8/38 b) 16/36 c) 10/36 d) 12/36 e) 14/36

| | 1 | 2 | 3* | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 0 | 0 | 100 | 0 | 0 | 0 | DIFF | 10 |
| L | 0 | 7 | 74 | 15 | 4 | 0 | DISC | 26 |

**17.** A coin is tossed 3 times. Determine:

**P(first and third tosses do not give the same result).**

| | |
|---|---|
| HHH | THH |
| HHT | THT |
| HTH | TTH |
| HTT | TTT |

a) 1/2 b) 1/4 c) 1/8 d) 3/4 e) 3/8

| | 1* | 2 | 3 | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 100 | 0 | 0 | 0 | 0 | 0 | DIFF | 11 |
| L | 78 | 0 | 11 | 11 | 0 | 0 | DISC | 22 |

**18.** Sally will be offered three bags of money in random order. No two of these bags contain the same amount. She is free to examine the amount inside each bag as it is presented to her but must accept it on the spot or refuse it and go on to the next bag. There is no going back. In making her decision she knows amounts already seen. Sally adopts the policy "examine the contents of the first bag but pass over that bag and accept the next if it contains an amount larger than did the first bag. If she passes over the second bag also then Sally will necessarily accept the contents of the third bag. We may as well specify the bag amounts (which are unknown to Sally).

| | |
|---|---|
| $2 $7 $1000 | $2 $1000 $7 |
| $7 $2 $1000 | $7 $1000 $2 |
| $1000 $2 $7 | $1000 $7 $2 |

**What is the probability Sally gets the $1000?**

a) 1/6 b) 2/6 c) 3/6 d) 4/6 e) 5/6

| | 1 | 2 | 3* | 4 | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 4 | 7 | 85 | 4 | 0 | 0 | DIFF | 48 |
| L | 7 | 44 | 26 | 19 | 4 | 0 | DISC | 59 |

**19-20.** A, B are events with $P(A) = 0.8$, $P(B) = 0.6$, $P(A \cap_{\text{and}} B) = 0.5$.

**19. Determine $P(A \cup_{\text{or}} B)$.**

a) .3 b) .1 c) .4 d) .83 e) .9

| | 1 | 2 | 3 | 4 | 5* | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 4 | 0 | 4 | 0 | 93 | 0 | DIFF | 25 |
| L | 11 | 7 | 26 | 7 | 48 | 0 | DISC | 44 |

**20. Determine $P(A \mid_{\text{if}} B)$.**

a) .3 b) .62 c) .4 d) .83 e) .9

| | 1 | 2 | 3 | 4* | 5 | OMT | NO | 101 |
|---|---|---|---|---|---|---|---|---|
| U | 4 | 11 | 0 | 85 | 0 | 0 | DIFF | 31 |
| L | 11 | 19 | 0 | 59 | 11 | 0 | DISC | 26 |