Problem set 19,20

● Graded

Student

Total Points

86 / 100 pts

Question 1

Exercise 9.1.17a

3 / 3 pts

✔ **– 0 pts** Correct

– 3 pts no answer

– 3 pts illegible

– 3 pts wrong problem

– 3 pts incorrect

– 1.5 pts incorrect or missing denominator

– 1.5 pts incorrect or missing numerator

Question 2

Exercise 9.1.17b

0 / 3 pts

– 0 pts Correct

– 3 pts no answer

– 3 pts illegible

– 3 pts wrong problem

✔ **– 3 pts** incorredt

– 1.5 pts incorrect or missing denominator

Question 3

Exercise 9.2.10a

3 / 3 pts

✔ **– 0 pts** Correct

– 3 pts no answer

– 3 pts illegible

– 3 pts wrong problem

– 3 pts incorrect

Question 4

Exercise 9.2.10b

3 / 3 pts

- ✔ **– 0 pts** Correct
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem
- **– 3 pts** incorrect

Question 5

Exercise 9.2.17a

3 / 3 pts

- ✔ **– 0 pts** Correct
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem
- **– 3 pts** incorrect

Question 6

Exercise 9.2.17b

0 / 3 pts

- **– 0 pts** Correct
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem
- ✔ **– 3 pts** incorrect

Question 7

Exercise 9.2.17c

3 / 3 pts

- ✔ **– 0 pts** Correct
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem
- **– 3 pts** incorrect
- **– 1 pt** first digit cannot be 0

Question 8

Exercise 9.2.17d

3 / 3 pts

✔ **– 0 pts** Correct

– 3 pts no answer

– 3 pts illegible

– 3 pts wrong problem

– 3 pts incorrect

– 1 pt first digit cannot be 0

Question 9

Exercise 9.2.17e

3 / 3 pts

✔ **– 0 pts** Correct

– 3 pts no answer

– 3 pts illegible

– 3 pts wrong problem

– 3 pts incorrect

– 1.5 pts two answers required

– 0 pts must be probabiliies

– 1 pt first disgit cannot be 0

Question 10

Exercise 9.2.28

1 / 3 pts

– 0 pts Correct

– 3 pts no answer

– 3 pts illegible

– 3 pts wrong problem

– 3 pts incorrect

✔ **– 2 pts** missing the +1's

Question 11

Exercise 9.2.39b

3 / 3 pts

- ✔ **– 0 pts** Correct
- **– 3 pts** incorrect
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem
- **– 1.5 pts** incorrect numerator
- **– 1.5 pts** incorrect demonimator

Question 12

Exercise 9.2.39d

0 / 3 pts

- **– 0 pts** Correct
- ✔ **– 3 pts** incorrect
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem
- **– 1.5 pts** incorrect numerator
- **– 1.5 pts** incorrect denominator

Question 13

Exercise 9.3.5a

3 / 3 pts

- ✔ **– 0 pts** Correct
- **– 3 pts** incorrect
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem
- **– 1 pt** wront upper bound
- **– 1 pt** wrong lower bound
- **– 1 pt** missing +1

Question 14

Exercise 9.3.7a

3 / 3 pts

✔ **– 0 pts** Correct

– 3 pts incorrect

– 2 pts there are 3 cases

– 3 pts no answer

– 3 pts illegible

– 3 pts wrong problem

Question 15

Exercise 9.3.7b

3 / 3 pts

✔ **– 0 pts** Correct

– 3 pts incorrect

– 2 pts there are 3 cases

– 3 pts no answer

– 3 pts illegible

– 3 pts wrong problem

Question 16

Exercise 9.3.12a

3 / 3 pts

✔ **– 0 pts** Correct

– 3 pts incorrect

– 3 pts no answer

– 3 pts illegible

– 3 pts wrong problem

Question 17

Exercise 9.3.12b

0 / 3 pts

- **– 0 pts** Correct
- **– 1.5 pts** should be doubled for TH and HT
- ✔ **– 3 pts** incorrect
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem

Question 18

Exercise 9.3.17a

3 / 3 pts

- ✔ **– 0 pts** Correct
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem

Question 19

Exercise 9.3.17b

3 / 3 pts

- ✔ **– 0 pts** Correct
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem
- **– 3 pts** incorrect

Question 20

Exercise 9.3.17c

3 / 3 pts

- ✔ **– 0 pts** Correct
- **– 3 pts** no answer
- **– 3 pts** illegible
- **– 3 pts** wrong problem
- **– 3 pts** incorrect

Question 21

Exercise 9.3.24a

4 / 4 pts

✔ **– 0 pts** Correct

– 4 pts incorrect template

– 4 pts no answer

– 4 pts illegible

– 4 pts wrong problem

– 4 pts incorrect

– 2 pts need to substract the intersection

– 1 pt arithmetic error

Question 22

Exercise 9.3.24b

4 / 4 pts

✔ **– 0 pts** Correct

– 4 pts incorrect template

– 3 pts no answer

– 4 pts illegible

– 4 pts wrong problem

– 4 pts incorrect

– 2 pts need to subtract the intersection

– 1 pt arithmetic error

Question 23

Exercise 9.3.24c

4 / 4 pts

✔ **– 0 pts** Correct

– 4 pts incorrect template

– 3 pts no answer

– 4 pts illegible

– 4 pts wrong problem

– 4 pts incorrect

– 2 pts need to ADD the intersection when computing set difference

Question 24

Exercise 9.3.34a

4 / 4 pts

✔ **– 0 pts** Correct

– 4 pts incorrect

– 4 pts no answer

– 4 pts illegible

– 4 pts wrong problem

Question 25

Exercise 9.3.34b

4 / 4 pts

✔ **– 0 pts** Correct

– 4 pts incorrect

– 4 pts no answer

– 4 pts illegible

– 4 pts wrong problem

– 2 pts partially correct

Question 26

Exercise 9.3.34c

4 / 4 pts

✔ **– 0 pts** Correct

– 4 pts incorrect

– 4 pts no answer

– 4 pts illegible

– 4 pts wrong problem

– 2 pts one/two incorrect

– 0 pts Click here to replace this description.

Question 27

Exercise 9.4.13

4 / 4 pts

✔ **– 0 pts** Correct

– 1.5 pts weak reason

– 1 pt incorrect number

– 3 pts no/incorrect reason

– 3 pts no answer

– 4 pts illegible

– 4 pts wrong problem

Question 28

Exercise 9.4.16

4 / 4 pts

✔ **– 0 pts** Correct

– 4 pts incorrect/no answer

– 4 pts illegible

– 4 pts wrong problem

Question 29

Exercise 9.4.28

4 / 4 pts

✔ **– 0 pts** Correct

– 3 pts no answer

– 4 pts illegible

– 4 pts wrong problem

– 4 pts incorrect

– 3 pts no reason

– 1 pt weak reason (no numbers)

Question 30

Exercise 9.4.30

4 / 4 pts

✔ **– 0 pts** Correct

– 3 pts no answer

– 4 pts illegible

– 4 pts wrong problem

– 4 pts incorrect

– 3 pts no reason

– 1.5 pts weak reason

I also worked with the following students (provide EMLPIDs only)

EMPLID	EMPLID	EMPLID
EMPLID	EMPLID	EMPLID
EMPLID	EMPLID	EMPLID
EMPLID	EMPLID	EMPLID

My answers came in part or in full from the following sources

Put your answer in each indicated box. Answers must be handwritten, legible and use correct notation.
Study the answers in Appendix A to similar problems so you know what your approach should be.
Larger boxes indicate that you are expected to provide substantial detail.
UNLESS OTHERWISE INSTRUCTED: do not use P(n,r) or C(n,r) notation as a final answer, do not reduce fractions, and do not expand factorials.

Students learning counting techniques often ask, "How do I know what to multiply and what to add? When do I use the multiplication rule and when do I use the addition rule?" Unfortunately, these questions have no easy answers. You need to imagine, as vividly as possible, the objects you are to count. You might even start to make an actual list of the items you are trying to count to get a sense for how to obtain them in a systematic way. You should then construct a model that would allow you to continue counting the objects one by one if you had enough time. If you can imagine the elements to be counted as being obtained through a multistep process (in which each step is performed in a fixed number of ways regardless of how preceding steps were performed), then you can use the multiplication rule. The total number of elements will be the product of the number of ways to perform each step. If, however, you can imagine the set of elements to be counted as being broken up into disjoint subsets, then you can use the addition rule. The total number of elements in the set will be the sum of the number of elements in each subset.

One of the most common mistakes students make is to count certain possibilities more than once.

— Discrete Structures, Susanna Epps, fourth edition, p.577

1. Exercise 9.1.17a

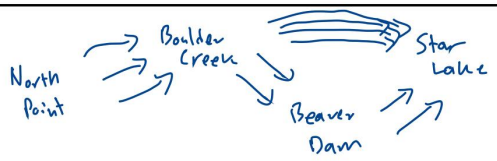
{RR, RB, RY, BR, BB, BY, YR, YB, YY}

$\frac{4}{9}$

2. Exercise 9.1.17b

$\frac{5}{9}$

3. Exercise 9.2.10a
(no sketch needed)



$3 \cdot 2 \cdot 2$

4. Exercise 9.2.10b
(no sketch needed)

$3 \cdot 4$

5. Exercise 9.2.17a

$9999 - 1000 + 1$

6. Exercise 9.2.17b

$2(500)+1$
$2(4999)+1$

$[500, 4999]$

$4999 - 500 + 1$

7. Exercise 9.2.17c

$9 \cdot 9 \cdot 8 \cdot 7$

8. Exercise 9.2.17d

$\underline{8} \cdot \underline{8} \cdot \underline{7} \cdot \underline{5}$

any digit except 0 and the last digit $\hookrightarrow \{1, 3, 5, 7, 9\}$

9. Exercise 9.2.17e

Probability of Distinct Digits: $\frac{9 \cdot 9 \cdot 8 \cdot 7}{9999 - 1000 + 1}$

Probability of distinct digits and odd: $\frac{8 \cdot 8 \cdot 7 \cdot 5}{9999 - 1000 + 1}$

10. Exercise 9.2.28

$(b-a)(d-c)$

11. Exercise 9.2.39b

$P(9,6) = \frac{9!}{(9-6)!}$

12. Exercise 9.2.39d

$P(7,6) = \frac{7!}{(7-6)!}$

13. Exercise 9.3.5a

$5 \cdot 7000 = 10{,}000$

$5 \cdot 19{,}999 = 99{,}995$

$[2000, 19999]$

$19999 - 2000 + 1$

14. Exercise 9.3.7a

$\underline{36} * \underline{36} * \underline{36} * \underline{36} + 36 \cdot 36 \cdot 36 \cdot 36 \cdot 36 + 36 \cdot 36 \cdot 36 \cdot 36 \cdot 36 \cdot 36$

$36^4 + 36^5 + 36^6$

15. Exercise 9.3.7b

$36 \cdot 35 \cdot 34 \cdot 33 + 36 \cdot 35 \cdot 34 \cdot 33 \cdot 32 + 36 \cdot 35 \cdot 34 \cdot 33 \cdot 32 \cdot 31$

16. Exercise 9.3.12a

$6!$

17. Exercise 9.3.12b

$2 \cdot 1 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = \boxed{2 \cdot 4!}$

18. Exercise 9.3.17a

$16 \cdot 15 \cdot 14 \cdot 13$

19. Exercise 9.3.17b

$(16 \cdot 16 \cdot 16 \cdot 16) - (16 \cdot 15 \cdot 14 \cdot 13)$

20. Exercise 9.3.17c

$$\frac{(16 \cdot 16 \cdot 16 \cdot 16) - (16 \cdot 15 \cdot 14 \cdot 13)}{(16 \cdot 16 \cdot 16 \cdot 16)}$$

21. Exercise 9.3.24a

multiples of 2 : $[1, 500] = 500 - 1 + 1$
multiples of 9 : $[1, 111] = 111 - 1 + 1$
multiples of 18 : $[1, 55] = 55 - 1 + 1$

$500 + 111 - 55$

22. Exercise 9.3.24b

$$\frac{500 + 111 - 55}{1000 - 1 + 1}$$

23. Exercise 9.3.24c

$(1000 - 1 + 1) - (500 + 111 - 55)$

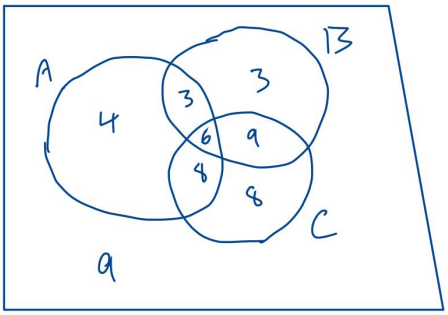
24. Exercise 9.3.34a

$50 - 41$

25. Exercise 9.3.34b

$41 - (21 + 21 + 31) + (9 + 14 + 15)$

26. Exercise 9.3.34c



27. Exercise 9.4.13

number: 7

why?

We have 12 boots (which are the pigeons) and we have 6 pairs (pigeonholes). Seven boots would guarantee a matched pair by the pigeonhole principle.

28. Exercise 9.4.16

$5 \cdot 1 = 5$
$5 \cdot 20 = 100$

$[1, 20]$
$20 - 1 + 1$
20 numbers divisible by 5

You must pick 81 integers to get at least one that is divisible by 5

29. Exercise 9.4.28

500 pigeons
17 pigeonholes

$500 = 17(29) + 7$

Yes there must have been at least one day where he wrote 30+ lines of codes because $500 = (17)(29) + 7$ so by the pigeonhole principle, seven days (pigeonholes) would have 30+ lines of code

30. Exercise 9.4.30

pigeons = 17 + 7 + 11 = 30
pigeonholes = 3

13 pennies