Questions 1-5

Setup:
- five digit product code

Conditions:
#1: 0 1 2 3 4
#2: each digit occurs exactly once
#3: $2^{nd} = 2 \times (1^{st})$
#4: $3^{rd} < 5^{th}$

Overview:
The third condition tells us that the first and second digits are either 1 and 2 or 2 and 4, respectively. Combining this information with the fourth condition, we can create two acceptable molds:

1	2	0|3	____	3|4
2	4	0|1	____	1|3
1st	2nd	3rd	4th	5th

We can further draw out all the possible solutions from these two molds.

#1	1	2	0	3	4
#2	1	2	0	4	3
#3	1	2	3	0	4
#4	2	4	0	1	3
#5	2	4	0	3	1
#6	2 (1st)	4 (2nd)	1 (3rd)	0 (4th)	3 (5th)

1. **(A)** This is a direct match with the fifth solution, and choice A is therefore correct.

2. (A) see solutions #4, #5, and #6
   (B) this is only true of solution #3
   (C) Correct – 2 is either first or second
   (D) this is only true of the solutions #1 and #5
   (E) this is only true of solution #4

3. **(C)** According to the solutions, 0 can occupy either the third or the fourth slots. Since it's not third, it must be fourth, and choice C is therefore correct.

4. **(E)** Checking the choices against the solutions reveals that only choice E presents an impossibility, and it is thus correct.

5. (A) see solutions #3, #4, and #6
   (B) see solutions #4 and #5
   (C) see solution #2
   (D) see solutions #4 and #6
   (E) Correct – with 2 second (solutions #1, #2, and #3), the latest 4 can be is fifth; with 2 first (solutions #4, #5, and #6), 4 is second

Questions 6-10

Setup:
- 3 films: G H L
- 3 days: Th F S
- each film once during the festival, but not more than once a day
- at least one film per day
- films are shown one at a time

Conditions:
#1: H is last on Thursday
#2: G or L but not both on Friday, none after
#3: G or H but not both on Saturday, none after

Overview:
The second and third conditions limit the number of films for Friday and Saturday to two, but Thursday is unrestricted, in that all three films can be shown on that day. From the second condition, we can deduce that if two films are shown on Friday, the first will be Harvest. From the third condition, we can deduce that if two films are shown on Saturday, the first will be Limelight.

H		
-------	G|L	G|H
-------	-------	-------
Th	F	S

6. (A) Greed is not shown
   (B) violates the second condition
   (C) Correct
   (D) violates the first condition
   (E) violates the second condition

7. **(A)** The second condition states that only Greed or Limelight can be last on Friday, and choice A, therefore, cannot be true.

8. **(D)** This question requires that Greed be shown as late as possible, so that Limelight can be shown as many times as possible. Putting Greed second on Saturday and filling in the rest of the slots with Harvest and Limelight reveals that at most, the festival can feature six showings.

H	L	G
L	H	L
Th	F	S

Assigning all three films to be shown on Thursday and filling in the rest of the slots with Greed and Harvest reveals the same maximum of six films shown during the festival.

H		
L	G	
G	H	G|H
Th	F	S

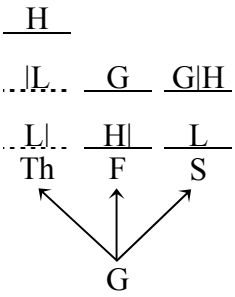
9. **(E)** Since Greed is shown three times, it has to be last on both Friday and Saturday. Harvest can't also be shown on Saturday (due to the third condition). Therefore, it has to be shown on Thursday and Friday. Since Limelight can't be shown on Friday (all the slots are full), it has to be shown on either Thursday or Saturday. Scanning the answer choices shows that E matches up with the new diagram.

H		
|G	G	G
G|	H	.....
Th	F	S

or

L

10. **(D)** For Limelight to be shown three times, it must be featured last on Friday and not last on both Thursday and Saturday. Greed could be featured on Thursday, Friday, or Saturday. Harvest will be featured last on Thursday and either first on Friday or last on Saturday. Since Greed or Limelight can be first on Thursday, D is the correct answer.



Questions 11-17

Setup:
- seven weeks
- four destinations: G J M T
- each destination at least once

Conditions:
#1: ~J_4
#2: T_7
#3: exactly two Ms, at least one G in between (M – G – M)
#4: J ⟶ GJ
#5: ~~GG~~ ~~JJ~~ ~~MM~~ ~~TT~~

Overview:
We know for certain that M will be featured exactly twice. Therefore, we can't have a scenario in which one destination is featured four times and the other three are each featured once. The possible allocations of weeks to destinations are:

3, 2, 1, 1 (M represents the 2)
2, 2, 2, 1 (M and two other destinations are featured twice)

If Jamaica is featured twice, Guadeloupe must also be featured twice (due to the fourth condition), and our list of variables will be G G J J M M T. We can also deduce that Jamaica can't be first or immediately to the right of any placed destinations due to the fourth condition. The second condition and the fifth condition tell us that Trinidad cannot be sixth since it is already seventh. Since each destination must be featured at least once, there will be a GJ piece.

1	2	3	4	5	6	T 7
~J			~J		~T	

11. **(A) Correct**
    (B) violates the third condition
    (C) violates the fourth condition
    (D) violates the first condition
    (E) violates the second condition

12. **(A)** The fifth condition states that a destination cannot be scheduled for two consecutive weeks, which would be the case if Trinidad were sixth.

13. **(D)** This new information, coupled with the fifth condition tells us that Trinidad can't be scheduled fourth. Also, since the GJ piece requires two spaces, it can only occupy either the first and second or the second and the third spaces.

1	2	3	G|M 4	T 5	G|M 6	T 7
~J			~J ~T		~T ~J	

Two possible scenarios can be created with this new information:

G	J	M	G	T	M	T

M	G	J	G|M	T	G|M	T
1	2	3	4	5	6	7

(A) Trinidad can't be first
(B) Martinique can't be second
(C) Guadeloupe can't be third
(D) Correct – see the second scenario
(E) Jamaica can't be sixth

14. **(E)** We know that Guadeloupe is the destination for week four (due to the fourth condition). Since Martinique has to surround Guadeloupe on both sides, it becomes clear that Martinique has to be the destination during the sixth week. With slots 2, 3, and 6 open, we know that Martinique must be sixth (third condition) and that Martinique and Trinidad will each occupy one of the second and third slots.

G	M|T	T|M	G	J	M	T
1	2	3	4	5	6	7

15. **(A)** With Guadeloupe first and Trinidad second, we only have four slots for M – GJ – M, thus filling out the entire diagram. Therefore, it must be true that Martinique is scheduled for week 3.

G	T	M	G	J	M	T
1	2	3	4	5	6	7

16. **(A)** The fifth condition combined with the new information tells us that Martinique cannot be second or fourth. Therefore, the fourth slot has to be occupied by either Guadeloupe or Trinidad, eliminating B and C.

		M	G|T			T
1	2	3	4	5	6	7
~J	~M		~J ~M		~T	

Let's examine the other choices:

(A) Correct – see the following diagram

G	J	M	G	T	M	T
1	2	3	4	5	6	7

(D) violates the third condition

(E) under this scenario, the GJ piece would have to be placed in the first and second positions, leaving no open spaces for the M – G – M condition

17. **(D)** This question asks the test taker to re-examine the setup and conditions. Since any week featuring Jamaica must be preceded by a week featuring Guadeloupe, it's a good idea to look at any choices with Jamaica. If Jamaica were to be featured for three weeks, Guadalupe would also be featured for three weeks, thus occupying the remaining six slots on the diagram. This scenario would leave no space for the two voyages to Martinique and choice D is therefore correct.

Questions 18-23

Setup:

- three recycling centers: 1 2 3
- exactly five materials recycled: G N P T W
- each center recycles two to three materials

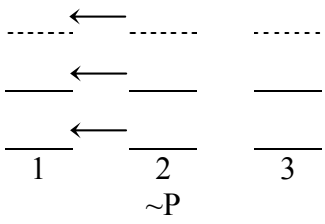
Conditions:

#1: W ⟶ [W / N]

#2: 2 ⟶ 1; ~1 ⟶ ~2 (contrapositive)

#3: only one center recycles P; [P / G]

Overview:
We can deduce that Center 2 does not recycle plastic since Center 1 would also recycle plastic, violating the third condition.



18. (A) Center 3 violates the first condition
(B) Correct
(C) violates the second condition
(D) violates the third condition
(E) violates the third condition

19. **(D)** Because Center 1 recycles every type of material that Center 2 does, Center 2 cannot recycle plastic. If it did, this would violate the second condition. Thus C and E are eliminated. Nothing prevents either Center 1 or Center 3 from recycling plastic, and thus choice D is correct.

20. **(C)** Since Center 2 recycles three types of materials, Center 1 must also recycle those same three types. As three is the maximum number of materials that can be recycled at any one center, and Center 2 cannot recycle plastic, the only center that can recycle plastic is Center 3. Thus, choice C is the correct answer.

21. **(D)** This question maximizes the number of materials that each center can recycle. Due to the second condition, Center 1 and Center 2 must recycle the same three materials. Logically, choices A, C, and E are all incorrect. Center 3 recycles plastic along with two other materials. In choice B, if Center 3 were the only center to recycle newsprint, no other center could recycle wood (due to the first condition). This would only leave tin and glass for the first two centers to recycle, violating the condition of the question stem. Thus, D is the only choice that could be true.

22. **(B)** We know that Center 3 can't recycle plastic due to the third condition. Center 2 can't recycle plastic because Center 1 would also recycle it, violating the third condition. Therefore, Center 1 must recycle plastic and recycle two other materials along with Center 2. Out of newsprint, tin, and wood, Center 1 must recycle two materials. Looking at the contrapositive of the first condition, if Center 1 didn't recycle newsprint, then it wouldn't recycle wood. Center 1 would therefore recycle plastic and tin. Following this line of reasoning, Center 2 would only recycle tin, which violates the condition that each center must recycle at least two types of materials. Therefore, Center 1 and Center 2 must recycle newsprint and B is correct.

P		-------
T|W	← T|W	W|T
N	← N	G
1	2	3

23. **(A)** Center 1 must also recycle newsprint due to the first condition. Since Center 1 is the only center to recycle wood, it must share two other types of material with Center 2, one of which has to be newsprint. Center 3 is the only center that can recycle plastic and it cannot recycle glass. Therefore, Center 1 and Center 2 must both recycle glass.

W		-------
G	← G	T
N	← N	P
1	2	3
~P	~P	~W
	~W	~G

(A) Correct – could be Center 3
(B) is incomplete because Center 1 recycles three types of material
(C) only Center 1 could recycle these two, but newsprint is missing from the list
(D) is incomplete because Center 1 recycles newsprint
(E) none of the three centers can recycle both glass and tin