5. Test savollari (20 ta)

1. Koshi tengsizligi $(a_1, \dots, a_n)$ va $(b_1, \dots, b_n)$ uchun to‘g‘ri ko‘rinishni tanlang.
A) $(a_1 + \dots + a_n)(b_1 + \dots + b_n) \leq a_1b_1 + \dots + a_nb_n$
B) $(a_1b_1 + \dots + a_nb_n)^2 \leq ({a_1}^2 + \dots + {a_n}^2) \cdot ({b_1}^2 + \dots + {b_n}^2)$
C) ${a_1}^2 + \dots + {a_n}^2 \leq {b_1}^2 + \dots + {b_n}^2$
D) $a_1b_1 + \dots + a_nb_n \geq 0$

2. Koshi tengsizligida tenglik qachon yuz beradi?
A) $a_i = b_i$ bo‘lsa
B) $a_i = 0$ bo‘lsa
C) $(a_1, \dots, a_n)$ va $(b_1, \dots, b_n)$ proportsional bo‘lsa
D) b_i lar turlicha bo‘lsa

3. $a^2 + b^2 = 1$ bo‘lsa, $a + b$ ning maksimal qiymati nechaga teng?
A) 1
B) $\sqrt{2}$
C) 2
D) $\sqrt{3}$

4. $a^2 + b^2 = 5$ bo‘lsa, $2a + b$ ning maksimal qiymati:
A) $\sqrt{5}$
B) 5
C) $\sqrt{25}$
D) $\sqrt{5} \cdot 5$

5. $a^2 + b^2 + c^2 = 1$ bo‘lsa, $a + b + c$ maksimal qiymati:
A) 1
B) $\sqrt{2}$
C) $\sqrt{3}$
D) 3

6. Koshi tengsizligidan quyidagilardan qaysi biri kelib chiqadi?
A) $(a + b)^2 \geq 2(a^2 + b^2)$
B) $(a + b)^2 \leq 2(a^2 + b^2)$
C) $(a + b)^2 = 2(a^2 + b^2)$
D) $a^2 + b^2 \leq 2ab$

7. $(a + b + c)^2 \leq 3(a^2 + b^2 + c^2)$ tengsizlikda tenglik qachon?
A) $a = b = c$ bo‘lsa
B) $a = b$ bo‘lsa
C) $c = 0$ bo‘lsa
D) $a = -b$ bo‘lsa

8. $a^2 + b^2 = 13$ bo‘lsa, $3a + 2b$ ning maksimal qiymati:
A) 13
B) $\sqrt{13}$
C) 5
D) 25

9. Engel (kasrli Koshi) tengsizligi uchun to‘g‘ri ifoda qaysi? ($x_i > 0$)
A) $a_1^2/x_1 + ... + a_n^2/x_n \geq (a_1 + ... + a_n)/(x_1 + ... + x_n)$
B) $a_1^2/x_1 + ... + a_n^2/x_n \geq (a_1 + ... + a_n)^2/(x_1 + ... + x_n)$
C) $a_1^2/x_1 + ... + a_n^2/x_n \leq (a_1 + ... + a_n)^2/(x_1 + ... + x_n)$
D) $a_1/x_1 + ... + a_n/x_n \geq (a_1 + ... + a_n)^2$

10. $a, b > 0$ uchun qaysi tengsizlik Koshi yordamida isbotlanadi?
A) $a + b \geq 2\sqrt{ab}$
B) $a^2/b + b^2/a \geq a + b$
C) $a^2 + b^2 \leq (a + b)^2$
D) $a - b \leq a + b$

11. $a^2 + b^2 = 4$ bo‘lsa, $a + 2b$ ning maksimal qiymati:
A) $2\sqrt{5}$
B) $\sqrt{5}$
C) 4
D) 5

12. $a^2 + b^2 + c^2 = 6$ bo‘lsa, $a + 2b + 2c$ maksimal qiymati:
A) 6
B) $3\sqrt{6}$
C) $\sqrt{54}$
D) $2\sqrt{6}$

13. Koshi tengsizligidan quyidagilardan qaysi biri to‘g‘ri baholash?
A) $ab \leq (a^2 + b^2)$
B) $(a + b)^2 \leq 4(a^2 + b^2)$
C) $a^2 + b^2 \leq (a + b)^2/2$
D) $a^2 + b^2 \leq ab$

14. $a^2 + b^2 + c^2 \geq ab + bc + ca$ tengsizlik qaysi usul bilan tez isbotlanadi?
A) $(a - b)^2 + (b - c)^2 + (c - a)^2 \geq 0$
B) Koshi tengsizligi
C) Induksiya
D) Trigonometrik almashtirish

15. $a^2 + b^2 = 10$ bo‘lsa, $a - 3b$ ning maksimal qiymati:
A) 10

B) $\sqrt{10}$
C) $3\sqrt{10}$
D) 100

16. $a^2 + b^2 = 5$ bo‘lsa, $2a - b$ ning maksimal qiymati:
A) $\sqrt{5}$
B) 5
C) 25
D) $2\sqrt{5}$

17. Engel ko‘rinishidan: $a^2/(b + c) + b^2/(c + a) + c^2/(a + b) \geq (a + b + c)/2$ isbotida maxrajlar yig‘indisi nimaga teng?
A) $a + b + c$
B) $2(a + b + c)$
C) $ab + bc + ca$
D) $(a + b + c)^2$

18. Koshi tengsizligida (a, b, c) va $(1, 2, 2)$ uchun $(a^2 + b^2 + c^2) = 6$ bo‘lsa, maksimal qiymat topishda $(1^2 + 2^2 + 2^2)$ nimaga teng?
A) 6
B) 8
C) 9
D) 12

19. Koshi tengsizligi quyidagilardan qaysi sohada eng ko‘p qo‘llanadi?
A) tengsizliklar va baholash masalalari
B) faqat geometriyada
C) faqat sonlar nazariyasida
D) faqat kombinatorikada

20. Koshi tengsizligi uchun $n = 2$ holatda to‘g‘ri formula qaysi?
A) $(a_1 + a_2)(b_1 + b_2) \leq a_1b_1 + a_2b_2$
B) $(a_1b_1 + a_2b_2)^2 \leq (a_1^2 + a_2^2) \cdot (b_1^2 + b_2^2)$
C) $(a_1^2 + a_2^2)^2 \leq (b_1^2 + b_2^2)^2$
D) $a_1b_1 + a_2b_2 \leq 0$

Javoblar

1. B
2. C
3. B
4. B
5. C
6. B
7. A
8. A
9. B
10. B
11. A
12. B
13. B
14. A
15. A
16. B
17. B
18. C
19. A
20. B