INEQUALITIES

Form 5
Vol 1

Part 5 – Quadratic Inequalities (MC)

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

1. C
2. C
3. D
4. B
5. C

$5x \le 7x^2$

$7x^2 - 5x \ge 0$

$x(7x-5) \ge 0$

$x \le 0$ or $x \ge \frac{5}{7}$

6. C

$x(x+3) < 8(x+3)$

$(x-8)(x+3) < 0$

$-3 < x < 8$

7. A

$6x^2 - x - 2 > 0$

$(3x-2)(2x+1) > 0$

$x < -\frac{1}{2}$ or $x > \frac{2}{3}$

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8. C

$$\because \begin{cases} (x+4)(x-1)<0 \\ -3x>2 \end{cases}$$

$$\therefore \begin{cases} -4<x<1 \\ x<-\frac{2}{3} \end{cases}$$

Thus, $-4<x<-\frac{2}{3}$.

9. D

$$(3x+1)^2 \le 3(3x+1)$$

$$(3x+1)^2-3(3x+1)\le 0$$

$$(3x+1)(3x+1-3)\le 0$$

$$(3x+1)(3x-2)\le 0$$

$$-\frac{1}{3}\le x\le \frac{2}{3}$$

10. C

$$8x^2+6x-27\le 0$$

$$(2x-3)(4x+9)\le 0$$

$$-2.25\le x\le 1.5$$

Thus, -2, -1, 0 and 1 are the integers that satisfy the inequality.

11. C

$$15x^2-37x-14<0$$

$$(5x-14)(3x+1)<0$$

$$-\frac{1}{3}<x<\frac{14}{5}$$

Thus, 0, 1 and 2 are the integers that satisfy the inequality.

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12. D

$(x+2)(3x-1)<40$

$3x^2-x+6x-2-40<0$

$3x^2+5x-42<0$

$(x-3)(3x+14)<0$

$-\frac{14}{3}<x<3$

Thus, $-4,-3,-2,-1,0,1$ and 2 are the integers that satisfy the inequality.

13. C

$3x^2+4x-7\le 0$

$(x-1)(3x+7)\le 0$

$-\frac{7}{3}\le x\le 1$

Thus, the required largest integer that satisfies the inequality is 1.

14. D

$\because x(x+1)>20$

$\therefore x^2+x-20>0$

$(x-4)(x+5)>0$

$x<-5$ or $x>4$

15. C

$\because (x-2)(x)<63$

$\therefore x^2-2x-63<0$

$(x-9)(x+7)<0$

$-7<x<9$

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16. C

$\because$ 2 is a root of the equation of $x^2+3x+k=0$

$\therefore (2)^2+3(2)+=0$

$k=-10$

$x^2+3x-10<0$

$(x-2)(x+5)<0$

$-5<x<2$

Part 6 – Delta Problems

1. B 2. C 3. C 4. B

1. B

$\because \Delta<0$

$\therefore k^2-4(5k)(3)<0$

$k^2-60k<0$

$k(k-60)<0$

$0<k<60$

2. C

$\because \Delta>0$

$\therefore (2k)^2-4(6-k)>0$

$k^2+k-6>0$

$k<-3$ or $k>2$

3. C

$\because \Delta\geq 0$

$\therefore (k-1)^2-4(2k-5)\geq 0$

$k^2-2k+1-8k+20\geq 0$

$k^2-10k+21\geq 0$

$k\geq 7$ or $k\leq 3$

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4. B

$3x^2 - kx + 12 > 0$

$\because \Delta < 0$

$\therefore k^2 - 4(3)(12) < 0$

$k^2 - 144 < 0$

$(k+12)(k-12) < 0$

$-12 < k < 12$

Part 7 – Special Problems

3. $x = \frac{3}{2}$

4. $x = \frac{5}{4}$

5. $x = \frac{7}{2}$

6.

$\because \Delta < 0$

$\therefore (-9)^2 - 4(4)(-k) < 0$

$81 + 16k < 0$

$k < -\frac{81}{16}$

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7.

$\because \Delta \le 0$

$\therefore \left[-(k-2)\right]^2 - 4(25) \le 0$

$k^2 - 4k + 4 - 100 \le 0$

$k^2 - 4k - 96 \le 0$

$(k-12)(k+8) \le 0$

$-8 \le k \le 12$

8.

$\because \begin{cases} k < 0 \\ \Delta < 0 \end{cases}$

$\therefore \begin{cases} k < 0 \\ \left(-4\sqrt{3}\right)^2 - 4k(2k+5) < 0 \end{cases}$

$\begin{cases} k < 0 \\ 2k^2 + 5k - 12 > 0 \end{cases}$

$\begin{cases} k < 0 \\ (2k-3)(k+4) > 0 \end{cases}$

$\begin{cases} k < 0 \\ k > \frac{3}{2} \text{ or } k < -4 \end{cases}$

Thus, $k < -4$.

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