

REV-MAE-2324-ASM-SET 1-MATH**Suggested solutions****Multiple Choice Questions**

1. C	2. C	3. C	4. C	5. B
6. A	7. D	8. B	9. C	10. A
11. B	12. C	13. C	14. C	15. D
16. C	17. C	18. A	19. C	20. C
21. D	22. B	23. C	24. D	25. D
26. A	27. A	28. C	29. D	30. A

1. ☐ C

$$bpx^2 + (bq + 1)x + (br + c) = 0$$

$$b(px^2 + qx + r) + x + c = 0$$

The roots are the x -coordinates of the intersection of $x + by + c = 0$ and $y = px^2 + qx + r$.

The roots are x_2 and x_5 .

2. ☐ C

$$6x + 8 = 4x^2 + 2x - 7$$

$$0 = 4x^2 - 4x - 15$$

$$x = -1.5 \quad \text{or} \quad 2.5$$

When $x = -1.5$, $y = 6(-1.5) + 8 = -1$; when $x = 2.5$, $y = 6(2.5) + 8 = 23$.

$(x, y) = (-1.5, -1)$ or $(2.5, 23)$

3. ☐ C

$$-4x - 1 = 2x^2 - x - 3$$

$$0 = 2x^2 + 3x - 2$$

$$x = -2 \quad \text{or} \quad \frac{1}{2}$$

When $x = -2$, $y = -4(-2) - 1 = 7$; when $x = \frac{1}{2}$, $y = -4\left(\frac{1}{2}\right) - 1 = -3$.

$(x, y) = \left(\frac{1}{2}, -3\right)$ or $(-2, 7)$

4. ☐ C

$$-2x + 7 = x^2 + 4x$$

$$0 = x^2 + 6x - 7$$

$$x = -7 \quad \text{or} \quad 1$$

When $x = -7$, $y = -2(-7) + 7 = 21$; when $x = 1$, $y = -2(1) + 7 = 5$.

5. B

$$3x^2 - x(7x - 16) = 12$$

$$-4x^2 + 16x - 12 = 0$$

$$x = 1 \quad \text{or} \quad 3$$

When $x = 1$, $y = 7(1) - 16 = -9$; when $x = 3$, $y = 7(3) - 16 = 5$.

6. A

$$-9x - 7 = x^2 + 6x + 7$$

$$0 = x^2 + 15x + 14$$

$$x = -1 \quad \text{or} \quad -14$$

When $x = -1$, $y = -9(-1) - 7 = 2$; when $x = -14$, $y = -9(-14) - 7 = 119$.

7. D

Put $x = 3y - 1$ into the first equation,

$$(3y - 1)^2 - y(3y - 1) - 3y^2 = 3$$

$$(9 - 3 - 3)y^2 + (-6 + 1)y + (1 - 3) = 0$$

$$y = 2 \quad \text{or} \quad -\frac{1}{3}$$

Only option D satisfies this.

8. B

$$3\left(\frac{4}{3}x + 1\right) = 6x^2 + x - 15$$

$$0 = 6x^2 - 3x - 18$$

$$x = 2 \quad \text{or} \quad -\frac{3}{2}$$

When $x = -\frac{3}{2}$, $y = \frac{4}{3}\left(-\frac{3}{2}\right) + 1 = -1$; when $x = 2$, $y = \frac{4}{3}(2) + 1 = \frac{11}{3}$.

9. C

$$3x - 14 = 2x^2 - 9x + c$$

$$0 = 2x^2 - 12x + (c + 14)$$

$$\Delta = 12^2 - 4(2)(c + 14) = 0$$

$$c = 4$$

10. A

$$mx + 8 = -5x^2 + 2x + 3$$

$$0 = -5x^2 + (2 - m)x - 5$$

$$\Delta = (2 - m)^2 - 4(-5)(-5) = 0$$

$$m^2 - 4m - 96 = 0$$

$$m = 12 \quad \text{or} \quad -8 \text{ (rejected)}$$

When $m = 12$,

$$0 = -5x^2 + (2 - 12)x - 5$$

$$0 = -5x^2 - 10x - 5$$

$$x = -1$$

When $x = -1$, $y = 12(-1) + 8 = -4$.

The solution is $(-1, -4)$.

11. B

$$-3x^2 + 8x - 1 = 5x - k$$

$$-3x^2 + 3x + k - 1 = 0$$

$$\Delta = 3^2 - 4(-3)(k - 1) \geq 0$$

$$k \geq \frac{1}{4}$$

12. C

$$x^4 - 23x^2 - 50 = 0$$

$$x^2 = 25 \quad \text{or} \quad -2 \text{ (rejected)}$$

$$x = \pm 5$$

13. C

$$(x^2 + 3x)^2 + 6(x^2 + 3x) - 40 = 0$$

$$x^2 + 3x = -10 \quad \text{or} \quad 4$$

$$x^2 + 3x = -10 \quad \text{or} \quad x^2 + 3x = 4$$

$$x^2 + 3x + 10 = 0 \quad x^2 + 3x - 4 = 0$$

$$\Delta = 3^2 - 4(1)(10) = -31 < 0 \quad x = -4 \quad \text{or} \quad 1$$

There are 2 distinct real roots.

14. C

$$x^4 + 21x^2 - 100 = 0$$

$$x^2 = 4 \quad \text{or} \quad -25 \text{ (rejected)}$$

$$x = \pm 2$$

15. D

$$x^6 + 35x^3 + 216 = 0$$

$$x^3 = -8 \quad \text{or} \quad -27$$

$$x = -2 \quad \text{or} \quad -3$$

16. C

$$x - \frac{8}{x-1} = 3$$

$$x(x-1) - 8 = 3(x-1)$$

$$x^2 - 4x - 5 = 0$$

$$x = 5 \quad \text{or} \quad -1$$

17. C

$$(2x+3)\left(1 - \frac{5}{x}\right) = -8$$

$$(2x+3)(x-5) = -8x$$

$$2x^2 + x - 15 = 0$$

$$x = -3 \quad \text{or} \quad \frac{5}{2}$$

18. A

$$\frac{12}{x^2-9} - \frac{2}{x-3} = 1$$

$$12 - 2(x+3) = (x+3)(x-3)$$

$$0 = x^2 + 2x - 15$$

$$x = -5 \quad \text{or} \quad 3$$

19. C

$$\frac{1}{4x-3} - \frac{1}{x-2} = 2$$

$$(x-2) - (4x-3) = 2(4x-3)(x-2)$$

$$0 = 8x^2 - 19x + 11$$

$$x = 1 \quad \text{or} \quad \frac{11}{8}$$

20. C

$$x - \sqrt{11(x+4)} = -4$$

$$(x+4)^2 = (\sqrt{11(x+4)})^2$$

$$x^2 + 8x + 16 = 11(x+4)$$

$$x^2 - 3x - 28 = 0$$

$$x = 7 \quad \text{or} \quad -4$$

21. D

$$x - 8\sqrt{x} + 15 = 0$$

$$\sqrt{x} = 3 \quad \text{or} \quad 5$$

$$x = 9 \quad \text{or} \quad 25$$

22. B

$$x - \sqrt{3x - 5} = 5$$

$$(-\sqrt{3x - 5})^2 = (5 - x)^2$$

$$3x - 5 = x^2 - 10x + 25$$

$$0 = x^2 - 13x + 30$$

$$x = 10 \quad \text{or} \quad 3 \text{ (rejected)}$$

23. C

$$3^{2x+1} - 4(3^x) + 1 = 0$$

$$3(3^x)^2 - 4(3^x) + 1 = 0$$

$$3^x = \frac{1}{3} \quad \text{or} \quad 1$$

$$x = -1 \quad \text{or} \quad 0$$

24. D

$$\text{We have } \begin{cases} x^2 - \log y = 4 \\ 2x - \log y^2 = 4 \end{cases}.$$

$$\left(\frac{4 + 2 \log y}{2} \right)^2 - \log y = 4$$

$$4 + 4 \log y + (\log y)^2 - \log y = 4$$

$$(\log y)^2 + 3 \log y = 0$$

$$\log y = 0 \quad \text{or} \quad -3$$

$$y = 10^1 \quad \text{or} \quad 10^{-3}$$

$$y = 1 \quad \text{or} \quad \frac{1}{1000}$$

25. D

$$\log_9 y + 2(\log_9 y)^2 = (x - 3) + (4 - x)$$

$$2(\log_9 y)^2 + \log_9 y - 1 = 0$$

$$\log_9 y = -1 \quad \text{or} \quad \frac{1}{2}$$

$$y = \frac{1}{9} \quad \text{or} \quad 3$$

26. A

$$\log_2(2x - 5) = \log_4(35 - 2x)$$

$$\frac{\log(2x - 5)}{\log 2} = \frac{\log(35 - 2x)}{2 \log 2}$$

$$\log(2x - 5)^2 = \log(35 - 2x)$$

$$(2x - 5)^2 = 35 - 2x$$

$$4x^2 - 18x - 10 = 0$$

$$x = 5 \quad \text{or} \quad -\frac{1}{2} \text{ (rejected)}$$

27. A

Let $BD = x$ cm.

Then $DE = \frac{42}{x}$ cm.

Since $\triangle EFC \sim \triangle ABC$,

$$\frac{x}{\left(20 - \frac{42}{x}\right)} = \frac{AB}{BC}$$

$$2x = 20 - \frac{42}{x}$$

$$2x^2 - 20x + 42 = 0$$

$$x = 3 \quad \text{or} \quad 7$$

Required length = 3 cm

28. C

Original number of pieces of cake = $\frac{120}{x}$

New number of pieces of cake = $\frac{120}{x - 1}$

Therefore, $\frac{120}{x - 1} - \frac{120}{x} = 5$.

29. D

$$\frac{x}{x + 3} - \frac{x + 2}{x + 3 + 5} = \frac{1}{10}$$

$$10x(x + 8) - 10(x + 2)(x + 3) = (x + 3)(x + 8)$$

$$-x^2 + 19x - 84 = 0$$

$$x = 7 \quad \text{or} \quad 12$$

30. A

Let the required number be n .

$$\frac{840}{2.25(n - 6)} - \frac{840}{2.25n} = 8$$

$$840n - 840(n - 6) = 18n(n - 6)$$

$$0 = 18n^2 - 108n - 5040$$

$$n = 20 \quad \text{or} \quad -14 \text{ (rejected)}$$