College Algebra Review Problems Version 1 [1]

1. Complete the square:

$$x^2 - 8x^2 + 1, \qquad 2x^2 - 8x + 2, \qquad -2x^2 - 8x + 2.$$

2. Solve the following linear equations:

$$2(x+1) = 3(x-5) \qquad 5(t-2) = 7t + 8.$$

3. Solve the following quadratic equations:

$$2x^2 - 5x + 2 = 0 \qquad x^2 - x - 5 = 0 \qquad 6x^2 - 5x + 1 = 0 \qquad x^2 - 10x - 56 = 0.$$

4. Solve the following equations:

$$2x^4 - 6x^2 + 4 = 0, \qquad 2\sqrt{x-1} + 1 = x, \qquad (x-1) + \frac{1}{x-1} = 2, \qquad \sqrt{2x+1} - \sqrt{6x+1} = -2.$$

5. Solve the following inequalities:

$$2x > 3(x-1), \qquad |3x+2| > 5, \qquad |2x+5| < 7.$$

6. Solve the following inequalities:

$$x^2 - 1 < 0; \qquad 3x^2 - 7x + 4 \geq 0; \qquad \frac{x+1}{x-1} > 0; \qquad \frac{x-1}{x+1} \leq 0.$$

7. Find the center and radius of the following equations:

$$x^2 - 2x + y^2 + 2y = 0; \qquad x^2 + 4x + y^2 = 6y + 3; \qquad x^2 + y^2 - 3y = 0.$$

8. Find the vertex and the axis of the following functions and draw the graphs:

$$y = x^2 + 2x; \qquad y = -x^2 + 2x + 2; \qquad x = -y^2 + 1; \qquad y = 2x^2 + 4x + 1.$$

9. Solve the following system of linear equations using substitution:

$$2x - y = 3, \qquad 3x + 3y = 9.$$

10. Solve the following system of linear equations using elimination:

$$5x + 2y = 9, \qquad 2x + 3y = 8.$$

11. Find the rational zeros of the following equations:

$$2x^3 + x^2 - 2x - 1 = 0; \qquad x^3 - 7x - 6 = 0; \qquad 3x^3 - 7x^2 - 7x + 3 = 0.$$

12. Find the domain of the following functions:

$$\frac{x}{x^2-1}; \qquad \sqrt{x-3}; \qquad \sqrt{\frac{x-1}{x+2}}; \qquad \frac{1}{\sqrt{2x^2-x-1}}.$$

13. Find the vertical and horizontal asymptotes of the following functions:

$$\frac{1}{x+1}-\frac{1}{x-1}; \qquad \frac{4x}{x^4-x^2-2}; \qquad \frac{2x^2-1}{x^2-4}.$$

14. Reduce the following rational functions:

$$\frac{x^2y^4}{xy^{-2}z}; \qquad \frac{xy+x}{x^3(y^2-1)}; \qquad \frac{u+v}{2u^2-2v^2}.$$

15. Rationalize the denominators:

$$\frac{x}{\sqrt{x+1}+\sqrt{x-1}}; \qquad \frac{a+b}{\sqrt{a+1}-\sqrt{1-b}}.$$

16. Express the following complex numbers in the standard form

$$\frac{1+i}{3+2i}; \qquad \frac{2+i}{4+5i}; \qquad \frac{3i+2}{2-i}.$$

17. Find the slope, the x-intercept and the y-intercept of the following equations:

$$y=3x+4; \qquad 3x+y=6; \qquad \frac{x}{2}+\frac{y}{3}=1.$$

18. Test the symmetries for the following equations:

$$y=x^2; \qquad x^2-y^2=1; \qquad x^4-2x^2+y=0; \qquad x=|y|.$$

19. Compute

$$\log_4 8; \qquad \log_{27}\frac{1}{3}; \qquad \log_5 1; \qquad \ln(\frac{1}{e}); \qquad \log 100.$$

20. Solve the following equations:

$$e^x+3e^{-x}=4; \qquad 4^{2x-1}=8; \qquad (2+x^2)^x=1; \qquad 3^{3-x}=81.$$

21. Solve the following equations:

$$(\ln x)^2-\ln(x^2)+1=0; \qquad \log_2(x-2)+\log_2(x+1)=2; \qquad \ln(x+1)=2\ln(x-1);$$

$$\log_2 x+\log_4 x=3; \qquad \log_2\sqrt{x-2}+\log_2\sqrt{x}=2\sqrt{2}; \qquad \log_x(2x+8)=2.$$

22. State the fundamental theorem of algebra.

23. Draw the graphs of the following functions:

$$y = -\sqrt{x+1}; \qquad y = x^2 - 2x + 3; \qquad y = (x-1)^3 - 2; \qquad y = e^{x+1}; \qquad ; y = (\ln x) - 1.$$

24. Find the equations of the following straight lines:

    (a) passing through $(2, 5)$ and $(6, 7)$;

    (b) passing through $(5, 1)$ with slope 3;

    (c) passing through $(7, 2)$ and parallel to $y + x = 1$.

25. Are the following functions one-to-one? If one-to-one, find the inverses.

$$y = x\sqrt{x} - 1; \qquad y = \sqrt{3x - 2}; \qquad y = x^2 + 1; \qquad y = 2^x; \qquad y = \ln \sqrt{x}.$$

26. Find if any of the following equations define y as a function of x:

$$y^2 = \frac{1}{x}; \qquad x^2 + xy = 1; \qquad \ln x + \ln y = 1; \qquad x^2 - y^2 = 1.$$

27. Solve the following system of equations:

    (a) $x^2 + y^2 = 3; \qquad 3x^2 - 4y^2 = 6.$

    (b) $x^2 - 2y^2 = 7; \qquad x + y = 4.$