1. Evaluate the following expressions.

[2] (a) $(2-2\cdot 3)^2 - |5^0 - 3^2|$

[3] (b) $\dfrac{1}{6} - \dfrac{3}{2}\left(\dfrac{5}{6} + \dfrac{1}{9}\right) \div \dfrac{17}{3}$

2. Simplify the following polynomial expressions.

[2] (a) $\frac{9}{4}x^2y + \frac{1}{7}xy^2 + \frac{3}{4}x^2y - xy^2$

[2] (b) $(x-3)^2 - (x+5)(x-5)$

[2] **3.** When you solve the following equation for x, you will discover either that it has no solution, or that x can be any number. Determine which is the case. Show work to justify your answer.

$$3(x+5) + 2x = \frac{10x+30}{2}$$

4. Solve for x in the following equations.

[3] (a) $3(5+7x) = 24 - [6(2-x) + 9x]$

[3] (b) $\dfrac{x}{6} - \dfrac{2x+4}{3} = \dfrac{x+6}{2} + \dfrac{x+7}{3}$

5. Simplify the following expressions and present the results without negative exponents. You may assume that all variables are non-zero.

[1] (a) $\dfrac{7}{2x^{-3}}$

[1] (b) $(3x^{-2})^3$

[2] (c) $\dfrac{(18x^5)(2x^3)}{30x^9}$

[2] (d) $\left(\dfrac{3xy^2z}{6x^8y^2}\right)^{-2}$

6. Factor the following polynomials completely.

[2] (a) $x^2 + 3x - 40$

[2] (b) $15x^2 - 11x + 2$

[3] (c) $x^3 - 7x^2 - 4x + 28$

7. Solve each of the following equations by **factoring**.

[2] (a) $9x^2 - 25 = 0$

[4] (b) $27x + x^3 = -12x^2$

[3] **8.** Solve the following equation using **the quadratic formula**. Simplify your answer(s) completely.

$$5x + 5 = 2x^2 + 2$$

9. Simplify each of the following expressions. You may assume that all variables represent positive numbers.

[3] (a) $\dfrac{\sqrt{50x^7y^6z^6}}{\sqrt{8x^4y^8z^{12}}}$

[3] (b) $x\sqrt{18x} + x\sqrt{75y^5} - y\sqrt{12x^2y^3} - 3\sqrt{2x^3}$

10. Rationalize the denominator of each expression and simplify completely.

[2] (a) $\dfrac{2}{\sqrt{8}}$

[2] (b) $\dfrac{18}{\sqrt{7}-4}$

11. Solve the following equations or show that there are no solutions.

[3] (a) $5 + \sqrt{4x-9} = 8$

[3] (b) $7 - \sqrt{1-4x} = 2x + 8$

[2] **12.** Find the **distance** between the points $(-3, 7)$ and $(5, 11)$. Simplify your answer as much as possible.

[1] **13.** Find the **midpoint** between the points $(-3, 7)$ and $(5, 11)$. Simplify your answer as much as possible.

[1] **14.** Determine the x- intercept of the line $7x + 3y = 14$.

[2] **15.** Draw the line $y = -\frac{1}{3}x - 2$ on the given grid.

16. Find an equation for the line in each case.

[1] (a) The horizontal line through the point $(-2, 6)$.

[3] (b) The line through the points $(-4, 3)$ and $(2, -1)$.

[3] (c) The line through the point $(5, 7)$ which is perpendicular to the line $y = 10x + 8$.

[3] **17.** Solve the following linear system by the method of **substitution**.

$$\begin{cases} x = 4y + 1 \\ 3x - 5y = -11 \end{cases}$$

[3] **18.** Solve the following linear system by the method of **elimination**.

$$\begin{cases} 5x - 2y = 5 \\ 9x - 4y = 7 \end{cases}$$

[2] **19.** Evaluate the following expression: $\log_5\left(\frac{1}{25}\right) + \ln e + \log_{100}(1)$

20. Solve each equation for x.

[3] (a) $8^{7x+3} = 4^{2x-1}$

[3] (b) $4(3 + e^{x/7}) = 20$

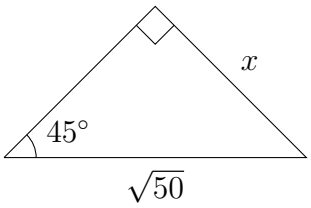
[3] **21.** If $\cos\theta = \frac{2}{5}$ for an acute angle θ in a right triangle, determine:

(a) $\sec\theta$

(b) $\tan\theta$

[3] **22.** Evaluate and simplify: $\sin(60°) + \frac{1}{2}\cot(30°)$

[3] **23.** Use trigonometry to find the value of x in the triangle below. Simplify your answer as much as possible.

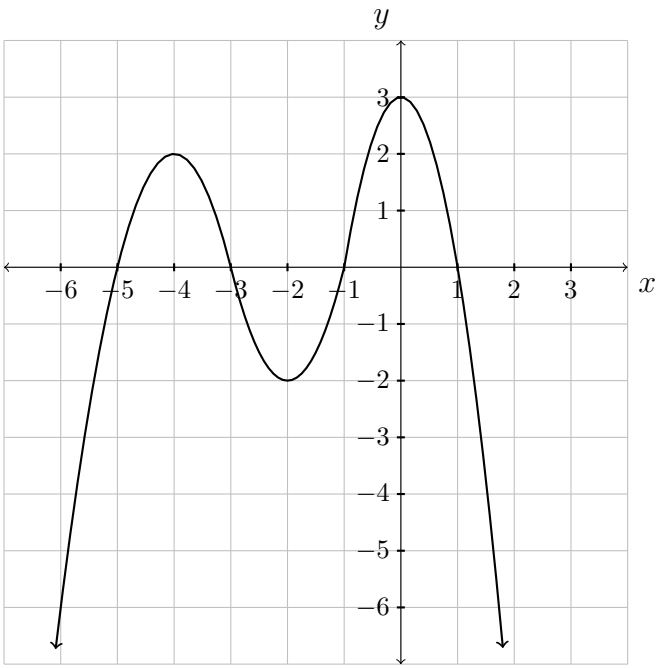


[4] **24.** Given $f(x) = x^2 - 2x$ and $g(x) = \log_2 x$, evaluate and simplify the following expressions.

(a) $f(5) + g(8)$

(b) $f(a+h) - f(a)$

[5] **25.** Given the graph of the function $f(x)$, determine the characteristics below.



(a) Domain

(b) Range

(c) x-intercept(s)

(d) Interval(s) over which $f(x)$ is positive

(e) Interval(s) over which $f(x)$ is increasing

Answers are on the next page

Answers:

1. (a) 8 (b) $-\frac{1}{12}$

2. (a) $3x^2y - \frac{6}{7}xy^2$ (b) $-6x + 34$

3. x can be any number.

4. (a) $-\frac{1}{8}$ (b) -5

5. (a) $\dfrac{7x^3}{2}$ (b) $\dfrac{27}{x^6}$ (c) $\dfrac{6}{5x}$ (d) $\dfrac{4x^{14}}{z^2}$

6. (a) $(x+8)(x-5)$ (b) $(3x-1)(5x-2)$
(c) $(x-7)(x-2)(x+2)$

7. (a) $x = -\frac{5}{3}, \frac{5}{3}$ (b) $x = -9, -3, 0$

8. $x = -\frac{1}{2}, 3$

9. a) $\dfrac{5x\sqrt{x}}{2yz^3}$ b) $3xy^2\sqrt{3y}$

10. a) $\dfrac{\sqrt{2}}{2}$ b) $-2\sqrt{7} - 8$

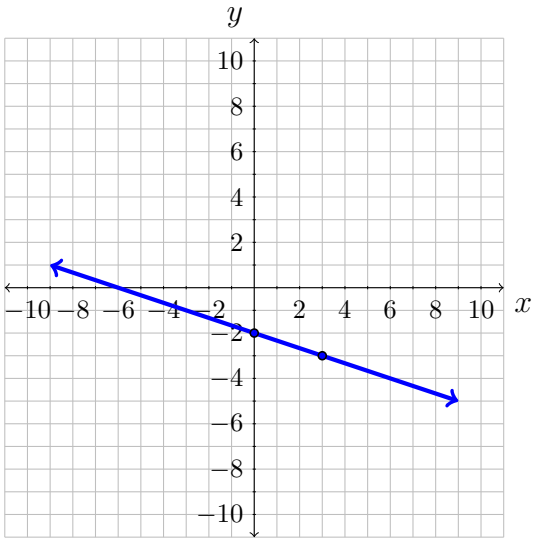
11. a) $x = \frac{9}{2}$ b) $x = -2$

12. $4\sqrt{5}$

13. $(1, 9)$

14. $(2, 0)$

15.



16. a) $y = 6$ b) $y = -\frac{2}{3}x + \frac{1}{3}$ c) $y = -\frac{1}{10}x + \frac{15}{2}$

17. $x = -7$, $y = -2$

18. $x = 3$, $y = 5$

19. -1

20. a) $x = -\frac{11}{17}$ b) $x = 7\ln 2$

21. a) $\frac{5}{2}$ b) $\frac{\sqrt{21}}{2}$

22. $\sqrt{3}$

23. $x = 5$

24. a) 18 b) $2ah - 2h + h^2$

25. a) $x \in (-\infty, \infty)$ b) $y \in (-\infty, 3]$
c) $x = -5, -3, -1, 1$ d) $x \in (-5, -3)$ and $(-1, 1)$
e) $x \in (-\infty, -4)$ and $(-2, 0)$