1. (6 points) Evaluate the following expressions:

(a) $5 - 3[(2-4)^3 + 4^0 - |2-5|]$

(b) $\dfrac{[(-1)^0 - (-2)^2]}{6} + \dfrac{2-7}{4-13}$

2. (4 points) Expand and simplify the following expression.

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

3. (6 points) Solve for x in the following equations:

(a) $2(x-1) - 3(2-x) = 4 \cdot [5-(x-1)]$

(b) $x + \dfrac{2-x}{2} = \dfrac{5}{6} - \dfrac{2x+5}{9}$

4. (4 points) Simplify the following expression and present the result without negative exponents. You may assume that all variables are positive.

$\dfrac{4(2xy^3z)^{-2}}{x^4y^{-5}z^0}(y^{-1}z)^{-3}$

5. (3 points) Factor the following polynomial completely:
$2x^3 + 5x^2 - 18x - 45$

6. (8 points) Solve the following equations **by factoring**:

(a) $3x^3 - 36x = 3x^2$

(b) $2(x^2-6) + 5x = 0$

7. (3 points) Solve the following equation using **the quadratic formula** $3x^2 - 5x - 2 = 0$. Simplify your answer.

8. (6 points) Simplify each of the following expressions. You may assume that all variables are positive.

(a) $2a^0b^2c\sqrt{16a^{25}b^8c^9}$

(b) $(2\sqrt{18} - \sqrt{2})(\sqrt{18} - 3\sqrt{2})$

9. (6 points) Rationalize the denominator of each expression and simplify:

(a) $\dfrac{\sqrt{2a^{-2}b^3c^5}}{\sqrt{6a^3b^7c^4}}$

(b) $\dfrac{5}{3\sqrt{2} - \sqrt{3}}$

10. (6 points) Solve the following equations or show that there are no solutions.

(a) $7 - 2\sqrt{5x-6} = 3$

(b) $x + \sqrt{10-x} = 8$

11. (2 points) For the line $4x - 5y = 20$, determine the x- and y- intercepts.

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

(a) (2 points) Line through $(3, 1)$ and parallel to $y = 3x - \frac{1}{3}$.

(b) (3 points) Through the points $(-3, -1)$ and $(-5, 5)$.

(c) (3 points) Through the point $(5, -2)$ and perpendicular to $4x + 3y = 7$.

(d) (2 points) Through the point $(-2, -7)$ and perpendicular to $x = -3$.

13. (3 points) Solve the following linear system by **the method of substitution**.

$$\begin{aligned} x - 2y &= 8 \\ 5x + 3y &= 1 \end{aligned}$$

14. (3 points) Solve the following linear system by **the method of elimination**.

$$\begin{aligned} 4x - 2y &= -13 \\ x - 3y &= -7 \end{aligned}$$

15. (2 points) Find the **distance** between the points $(5, -3)$ and $(7, -9)$. Simplify your answer.

16. (2 points) Find the **midpoint** between the points $(-7, 3)$ and $(-3, \frac{1}{3})$. Simplify your answer.

17. (6 points) Solve each equation for x:

(a) $9^{x+3} = 27^{2x+10}$

(b) $3^{x-2} - 2 = 8$

18. (4 points) Evaluate the following expression: $\log_2(4^{-1}) - 3\log_9 1 - 2\ln(e^3) + \log_3 27$

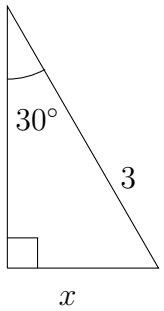
19. (4 points) If $\sin\theta = \frac{1}{3}$ for an acute angle θ in a right triangle, determine and simplify:

(a) $\csc\theta$

(b) $\tan\theta$

20. (2 points) Evaluate: $\cos 30^\circ - \dfrac{1}{2}\cot 45^\circ$

21. (2 points) Find the value of x in the triangle below. Simplify your answer.



22. (3 points) Given $f(x) = x^2 - x + 2$ and $g(x) = 1 - x$, evaluate and simplify the following expressions

 Question 22 continues on the next page.

(a) $f(-2) - g(-1) =$

(b) $\dfrac{f(1)}{g(2)} =$

(c) $f(x+h) - f(x) =$

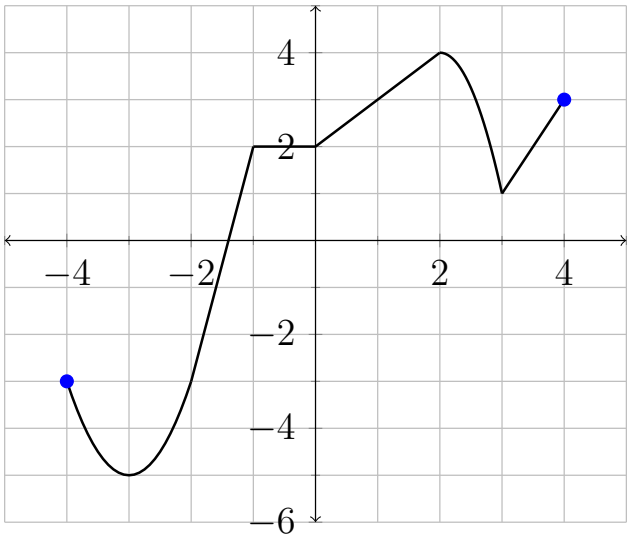
23. (5 points) Given the graph of the function $f(x)$, determine the characteristics below:

(a) the domain of $f(x)$;

(b) the range of $f(x)$;

(c) the interval(s) over which f is decreasing;

(d) $f(-2) + f(2)$;



Answers:

1a. 35, 1b. 1/18, 2. $6x^2 - 29x + 40$, 3a. $x = 32/9$, 3b. $x = -1$, 4. $\frac{y^2}{x^6 z^5}$, 5. $(2x+5)(x-3)(x+3)$, 6a. $x = 0$, $x = 4$, $x = -3$, 6b. $x = -4$, $x = 3/2$, 8a. $8a^{12}b^6c^5\sqrt{ac}$, 8b. 0, 9a. $\frac{\sqrt{3ac}}{3a^3b^2}$, 9b. $\frac{3\sqrt{2}+\sqrt{3}}{3}$, 10a. $x = 2$, 10b. $x = 6$, 11. $x = 5$, $y = -4$, 12a. $y = 3x - 8$, 12b. $y = -3x - 10$, 12c. $y = \frac{3}{4}x - \frac{23}{4}$, 12d. $y = -7$, 13. $x = 2$, $y = -3$, 14. $x = -\frac{5}{2}$, $y = \frac{3}{2}$, 15. $2\sqrt{10}$, 16. $(-5, \frac{5}{3})$, 17a. $x = -6$, 17b. $x = \log_3 10 + 2$, 18. -5, 19a. 3, 19b. $\frac{1}{\sqrt{8}}$, 20. $\frac{\sqrt{3}}{2} - \frac{1}{2}$, 21. $x = \frac{3}{2}$, 22a. 6, 22b. -2, 22c. $2xh + h^2 - h$, 23a. $D = [-4, 4]$, 23b. $R = [-5, 4]$, 23c. $(-4, -3) \cup (2, 3)$, 23d. 1, 23e. $y = 2$.