1. (6 points) Evaluate the following expressions.

(a) $(2-3)^5 - 5(9-3^2) + 36^0$

(b) $(4-6)^3 \div \dfrac{1-(-3)}{1+3(1^2-2)} - \dfrac{4}{5}$

(c) $\dfrac{1-2^2}{2^3-3^2} \div \left|\dfrac{5-(-2)^2}{1-9}\right| + 4$

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

(a) $(2x-3)(4x^2+6x+9) - (2x)^3$

(b) $(2t-3s)(2t+3s) - 4(t-2)^2$

3. (2 points) A tumble dryer is sold at a 20% discount for \$640. What was the original selling price of the dryer? [Recall: Selling Price=Original Price - Original Price · Discount Rate]

4. (2 points) What was the initial sum deposited to my 1.2% Tax-Free Savings Account if I gained \$3000 in simple interest over the last ten years? [Recall: $I = P \cdot r \cdot t$]

5. (2 points) A toaster oven is sold for \$26 in a store that marks up small kitchen appliances by 30%. What was the original price of the toaster oven? [Recall: Selling Price=Cost + Cost · Markup Rate]

6. (6 points) Solve the following equations.

(a) $\dfrac{x+3}{7} = \dfrac{x}{4} - 3$

(b) $5(a+1) - 3(2-a) = 1 + 2(a+4) + 4(2a-3)$

(c) $(t-3)(t+1) = t^2 + t - 3$

7. (3 points) Consider the line that passes through the points (-5,2) and (1,3).

(a) Find the slope of the line.

(b) Find the equation of the line.

(c) Find the x-intercept of the line.

8. (5 points) Consider the line passing through the point (2,1) and parallel to $2x + y = 7$.

(a) Find the equation of the line.

(b) Sketch both lines in the same coordinate system.

9. (3 points) Solve the following linear system by the method of substitution.

$$\begin{cases} 2x + 3y = 11 \\ 5x - y = 7 \end{cases}$$

10. (3 points) Solve the following linear system by the method of elimination.

$$\begin{cases} 4x + 3y = 4 \\ 2x - 6y = -3 \end{cases}$$

11. (4 points) Simplify each of the following expressions and present the result without negative exponents. You may assume that all variables are positive.

(a) $\left(2ab^{-2}c^{1}\right)^{3}\left(4b^{2}c^{-1}\right)^{-1} =$

(b) $\left(\dfrac{30x^{2}y^{-2}z^{3}}{45z^{0}x^{-1}y^{5}}\right)^{-2} =$

12. (4 points) Factor each polynomial completely.

(a) $2x^2 - 7x - 15$

(b) $a^2 - 8a^5$

13. (3 points) Solve the equation $\sqrt{5x-1} = x + 1$ or show that it has no solutions.

14. (6 points) Solve the following equations for x by factoring.

(a) $(2x+1)(x+1) = 28$

(b) $x^3 + 2x^2 + 1 = x^4 + 1$

(c) $x^3 - 4x^2 - 9x + 36 = 0$

15. (3 points) **By taking square roots**, find all solutions to $16(5x-1)^2 - 2^2 = 0$.

16. (3 points) **By completing the square**, find all solutions to $x^2 + 10x + 23 = 0$.

17. (3 points) **By using the Quadratic Formula**, find all solutions to $2x^2 - 5 = 8x$.

18. (8 points) Simplify each of the following expressions. You may assume that all variables are positive.

(a) $\sqrt{50} - \sqrt{18} + 3\sqrt{8}$

(b) $(3\sqrt{3} - \sqrt{20})(3\sqrt{5} + \sqrt{12})$

(c) $\sqrt{30x^6y^5z^1}$

(d) $\sqrt{\dfrac{12a^{-4}b^2}{27a^4b^{-1}}}$

19. (4 points) Rationalize the denominator of each expression and simplify.

(a) $\dfrac{7\sqrt{12}}{10 - 2\sqrt{3}}$

(b) $\dfrac{4}{x - \sqrt{x^2+2}}$

20. (3 points) Evaluate the following logarithms.

(a) $\log_2(32)$

(b) $\ln(e^{-2})$

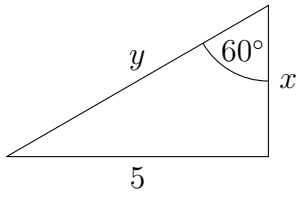
(c) $\log_4\left(\dfrac{1}{64}\right)$

21. (4 points) Solve each equation for x.

(a) $2^{3x-5} + 2^4 = 2^5$

(b) $\dfrac{1}{3^{x-5}} = 27$

22. (2 points) Find the exact value of x and y in the right triangle below.

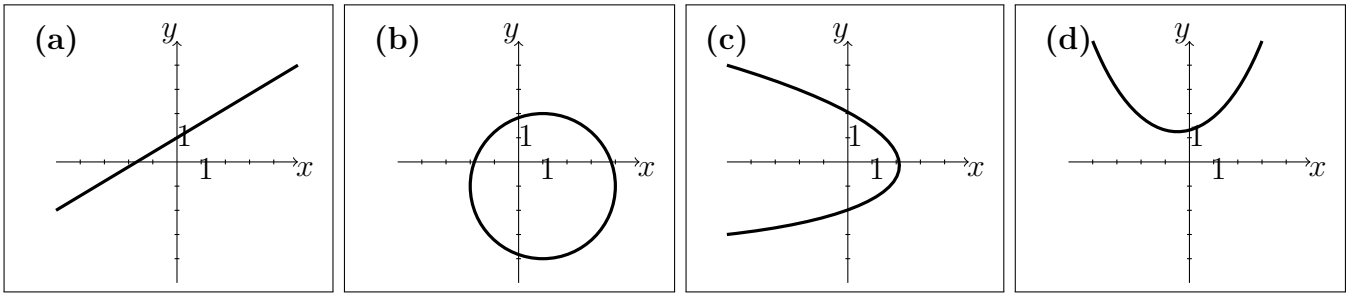


23. (3 points) If $\sec\theta = \dfrac{4}{\sqrt{3}}$ for the acute angle θ in a right triangle, find the exact values of the other five trigonometric functions.

24. (2 points) Find the midpoint between the points $(3, 4)$ and $(2, -2)$.

25. (2 points) Find the distance between the points $(2, -2)$ and $(3, 2)$.

26. (2 points) Which of the following are graphs of relations for which y is function of x?



27. (4 points) Given $f(z) = z^3 - 5z + 2$, evaluate and simplify the following expressions.

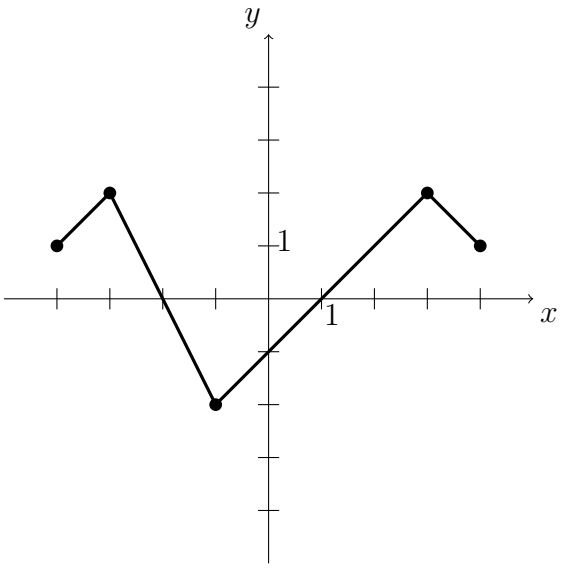
(a) $f(-2)$

(b) $f\left(\dfrac{2}{3}\right)$

(c) $f\left(\sqrt{2}\right)$

(d) $f(z + h)$

28. (4 points) Given the graph $y = f(x)$ of a function $f(x)$, find



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

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

(c) the x-intercepts:

(d) the y-intercept:

(e) the intervals where $f(x)$ is positive:

(f) the intervals where $f(x)$ is negative:

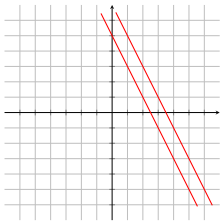
(g) the local minima of $f(x)$:

(h) the local maxima of $f(x)$:

Answers

1. (a) 0 (b) $\frac{16}{5}$ (c) 28 **2.** (a) -27 (b) $-9s^2+16t-16$ **3.** 800\$ **4.** 25000\$ **5.** 20\$

6. (a) $x=32$ (b) $a=1$ (c) $t=0$ **7.** (a) $\frac{1}{6}$ (b) $y=\frac{1}{6}x+\frac{17}{6}$ (c) $(-17,0)$

8. (a) $y=-2x+5$ (b)  **9.** $x=\frac{32}{17}$, $y=\frac{41}{17}$ **10.** $x=\frac{1}{2}$, $y=\frac{2}{3}$

11. (a) $\frac{2a^3c^4}{b^8}$ (b) $\frac{9y^{14}}{4x^6z^6}$ **12.** (a) $(2x+3)(x-5)$ (b) $a^2(1-2a)(1+2a+4a^2)$ **13.** $x=1$, $x=2$

14. (a) $x=3$, $x=-\frac{9}{2}$ (b) $x=-1$, $x=0$, $x=2$ (c) $x=-3$, $x=3$, $x=4$ **15.** $x=\frac{3}{10}$, $x=\frac{1}{10}$

16. $x=-5+\sqrt{2}$, $x=-5-\sqrt{2}$ **17.** $x=2+\frac{\sqrt{26}}{2}$, $x=2-\frac{\sqrt{26}}{2}$

18. (a) $8\sqrt{2}$ (b) $-12+5\sqrt{15}$ (c) $x^3y^2\sqrt{30yz}$ (d) $\frac{2b\sqrt{b}}{3a^4}$ **19.** (a) $\frac{35\sqrt{3}+21}{22}$ (b) $-2(x+\sqrt{x^2+2})$

20. (a) 5 (b) -2 (c) -3 **21.** (a) $x=3$ (b) $x=2$ **22.** $x=\frac{5\sqrt{3}}{3}$, $y=\frac{10\sqrt{3}}{3}$

23. $\sin\theta=\frac{\sqrt{13}}{4}$, $\cos\theta=\frac{\sqrt{3}}{4}$, $\tan\theta=\frac{\sqrt{39}}{3}$, $\csc\theta=\frac{4\sqrt{13}}{13}$, $\cot\theta=\frac{\sqrt{39}}{13}$ **24.** $\left(\frac{5}{2},1\right)$ **25.** $\sqrt{17}$

26. functions: (a) and (d) **27.** (a) 4 (b) $-\frac{28}{27}$ (c) $-3\sqrt{2}+2$ (d) $z^3+3z^2h+3zh^2+h^3-5z-5h+2$

28. (a) $[-4,4]$ (b) $[-2,2]$ (c) $(-2,0)$ and $(1,0)$ (d) $(0,-1)$ (e) $[-4,-2)$ and $(1,4]$
(f) $(-2,1)$ (g) $x=-1$, $f(-1)=-2$ (h) $x=-3$, $f(-3)=2$ and $x=3$, $f(3)=2$