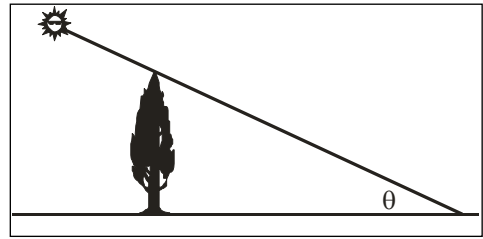


1. (4 points) Simplify to a single fraction in lowest terms.  $\frac{2x-4}{x^2+3x-10} - \frac{x+7}{x^2+6x+5}$
2. (4 points) Simplify the complex fraction in lowest terms.  $\frac{\frac{1}{x+2} - \frac{1}{x-2}}{\frac{1}{x-2} + \frac{3}{x+2}}$
3. (4 points) Simplify (positive exponents only in your answer).  $\left(\frac{y^9 x^4}{x^{-3} y^4}\right)^{-4/5}$
4. (3 points) Rationalize the denominator.  $\frac{x+\sqrt{y}}{x-\sqrt{y}}$
5. (4 points) Solve the formula  $\frac{P+T}{P-T} = R$  for  $T$ .
6. (3 points) Solve the equation.  $3x^2 - 2x = 11$
7. (6 points) Consider the points  $P(9, -4)$  and  $Q(-3, -12)$ .
- Find the distance from  $P$  to  $Q$ .
  - Find the midpoint of the line segment  $PQ$ .
  - Find the slope of the line passing through  $P$  and  $Q$ .
8. (4 points) Find an equation of each of the following lines.
- The line through the points  $(5, -2)$  and  $(-1, 10)$
  - The line through  $(-7, 8)$  that is perpendicular to the line  $2x + 8y = 2$ .
9. (6 points) Graph the function.  $f(x) = \begin{cases} 4 & \text{if } x < -1 \\ -x+5 & \text{if } -1 \leq x < 1 \\ 2x+3 & \text{if } 1 < x \end{cases}$  State the domain and range.
10. (9 points) For  $f(x) = x^3 - 7$  and  $g(x) = 2x^2 + 6x + 9$ .
- Find  $f^{-1}(x)$ .
  - Simplify the difference quotient  $\frac{g(x+h) - g(x)}{h}$ .
  - Calculate  $(g \circ f)(3)$ .
11. (4 points) Graph the function  $f(x) = 2x^2 - 6x + 3$ .
12. (12 points) Solve each of the following equations.
- $9^{2x-3} = \left(\frac{1}{27}\right)^{5-x}$
  - $5^{3x+2} = 8^{x+4}$
  - $\log_5(3x+1) - \log_5(7x+3) = 2$
13. (4 points) Graph the function  $y = \log_2(x-5)$ . Show the asymptote and state the domain.
14. (4 points) Rewrite  $\log_2\left(\frac{8\sqrt{x}}{y^3 z^2}\right)$  as a sum and/or difference of simple logarithms.
15. (5 points) Find the exact value of the other 5 trig functions if  $\cos \theta = -\frac{12}{13}$  and if  $\sin \theta < 0$ .
16. (4 points) Find the exact value of each of the following. Show the details of your work.
- $\sec(855^\circ)$
  - $\tan\left(-\frac{5\pi}{6}\right)$

17. (4 points) A 47 m tall tree casts a shadow 71 m long. Find angle  $\theta$ .



18. (4 points) State the amplitude and period and graph one period of  $y = 3 \cos(2x)$ .

19. (4 points) Verify the identity  $\frac{\cot^2 t - 1}{\cot^2 t + 1} = 1 - 2 \sin^2 t$ .

20. (4 points) Verify the identity  $\frac{\cos(A - B)}{\cos A \sin B} = \tan A + \cot B$ .

21. (4 points) Solve for  $x$  ( $0 \leq x < 2\pi$ ) given  $4 \sin^2 x = 3$ .

**Answers**

1.  $\frac{x-5}{(x+5)(x+1)}$     2.  $\frac{-1}{x-1}$     3.  $\frac{1}{x^{28/5}y^4}$     4.  $\frac{x^2 + 2x\sqrt{y} + y}{x^2 - y}$     5.  $T = \frac{RP - P}{1 + R}$

6.  $x = \frac{1 \pm \sqrt{34}}{3}$     7(a)  $4\sqrt{13}$     7(b)  $(3, -8)$     7(c)  $\frac{2}{3}$     8(a)  $y = -2x + 8$     8(b)  $y = 4x + 36$

9. Domain:  $x \neq 1$     Range:  $4 \leq y$     10(a)  $f^{-1}(x) = \sqrt[3]{x+7}$     10(b)  $4x + 2h + 6$     10(c) 929

11. x-intercepts: 2.36 & 0.63    y intercept: 3    vertex: (1.5, -1.5)    12(a) -9    12(b) 1.854902658

12(c) No solution    13. asymptote:  $x=5$     14.  $3 + \frac{1}{2} \log_2 x - 3 \log_2 y - 2 \log_2 z$

15.  $\sin \theta = -\frac{5}{13}$      $\tan \theta = \frac{5}{12}$      $\csc \theta = -\frac{13}{5}$      $\sec \theta = -\frac{13}{12}$      $\cot \theta = \frac{12}{5}$     16(a)  $-\sqrt{2}$     16(b)  $\frac{\sqrt{3}}{3}$

17.  $\theta = 33.5034^\circ$     18. amplitude 3    period  $\pi$     21.  $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

