

1. Find the linear function  $f(x)$  satisfying the conditions that  $f\left(\frac{1}{5}\right) = -3$  and the graph of  $f$  is a line parallel to the line  $x = y - 1$ .
- $f(x) = x - \frac{16}{5}$
  - $f(x) = \frac{16}{5}x - 1$
  - $f(x) = -x - \frac{16}{5}$
  - $f(x) = 3x - \frac{16}{5}$
  - $f(x) = x + \frac{14}{5}$
2. Find the maximum or minimum value (whichever is appropriate) for  $y = x^2 - 8x + 11$ . State whether the value is a maximum or minimum.
- 5: minimum value
  - 4: minimum value
  - 5: maximum value
  - 4: maximum value
  - 5: minimum value
3. The product of two numbers is 16. Express the sum of the squares  $S(x)$  of the two numbers as a function of a single variable.
- $S(x) = x^2 + \frac{256}{x^2} - 16$
  - $S(x) = x^2 + \frac{256}{x^2}$
  - $S(x) = 2x^2 + \frac{16}{x^2}$
  - $S(x) = 256x^2 + \frac{1}{x^2}$
  - $S(x) = 16x^2 + \frac{225}{x^2}$
4. Two numbers add to 7. What is the largest possible value of their products?
- $\frac{49}{4}$
  - $\frac{57}{2}$
  - 7
  - 12
  - $\frac{49}{3}$
5. The perimeter of a rectangle is 40 m. Find the dimensions of the rectangle for which the diagonal is as short as possible.
- 3 m by 17 m
  - 1 m by 19 m
  - 10 m by 10 m
  - 5 m by 15 m
  - 9 m by 9m
6. Find all  $x$ - and  $y$ - intercepts for  $y = (x - 3)(x + 2)(x + 1)$ .
- $x$ - intercepts:  $-3, -2, 1$  and  $y$ -intercept:  $-6$
  - $x$ - intercepts:  $-2, -1, 3$  and  $y$ -intercept:  $-6$
  - $x$ - intercepts:  $-3, 1, 2$  and  $y$ -intercept:  $6$
  - $x$ - intercepts:  $-2, -1, 3$  and  $y$ -intercept:  $-6$
  - $x$ - intercepts:  $-2, -1, 3$  and  $y$ -intercept:  $6$
7. Find all vertical and horizontal asymptotes for  $y = \frac{6x - 3}{3x + 1}$ .
- vertical asymptote:  $x = -\frac{1}{3}$ ; horizontal asymptote:  $y = 2$
  - vertical asymptote:  $x = \frac{1}{3}$ ; horizontal asymptote:  $y = 2$
  - vertical asymptote:  $x = 3$ ; horizontal asymptote:  $y = \frac{1}{3}$
  - vertical asymptote:  $x = -1$ ; horizontal asymptote:  $y = 6$
  - no vertical asymptote: no horizontal asymptote
8. Solve  $2^{5-2y} = \sqrt{2}$ .
- $y = \frac{11}{4}$
  - $y = \frac{13}{4}$
  - $y = \frac{3}{4}$
  - $y = \frac{9}{4}$
  - no solution.
9. Specify the range of the function  $y = -e^{-x}$ .
- $(0, \infty)$
  - $(-\infty, \infty)$
  - $(-\infty, 0)$
  - $[0, \infty)$
  - $(-\infty, 0]$

10. Solve  $(10^x)^2 = 90$ .

- a)  $x = \frac{1}{2} \log_{10} 90$
- b)  $x = \log_{90} 10$
- c)  $x = \sqrt{\log_{10} 90}$
- d)  $x = \log_{10} 90$
- e)  $x = \frac{1}{2} \log_{90} 10$

11. Simplify  $\log_{10} 16 + \log_{10} \left(\frac{5}{8}\right)$ .

- a) 1
- b) 4
- c) 3
- d) 2
- e) 1.6

12. Solve  $7^{3x-1} = 8$ .

- a)  $x = \frac{\ln 56}{\ln 7} \cdot \frac{1}{3}$
- b)  $x = \frac{\ln 7}{\ln 8}$
- c)  $x = \frac{\ln 7}{\ln 2} - \frac{1}{3}$
- d)  $x = \frac{\ln 8}{\ln 7} + \frac{1}{3}$
- e)  $x = \frac{\ln 2}{\ln 7} + \frac{1}{3}$

13. Solve  $\log_5[\log_5(4x)] = -3$ .

- a)  $x = \frac{1}{4} 5^{-3}$
- b)  $x = 5^{5^{-3}}$
- c)  $x = \frac{1}{4} 5^{5^{-3}}$
- d)  $x = \frac{1}{4} 25^{-3}$
- e)  $x = 5^{-3}$

14. Solve  $\log_{10}(x+7) - \log_{10}(x-9) = 2$ .

- a)  $x = 9 \frac{16}{99}$
- b)  $x = \frac{9 - \sqrt{17}}{2}$
- c)  $x = 7 \frac{16}{99}$
- d)  $x = \frac{907}{99}$
- e) no solution

15. Suppose that  $\triangle ABC$  is a right triangle with  $\angle C = 90^\circ$ . If  $AC = 1$  and  $BC = \frac{5}{9}$ , find  $(\tan A)(\tan B)$ .

- a)  $\frac{25}{81}$
- b)  $\frac{1}{9}$
- c)  $\frac{81}{25}$
- d)  $\frac{9}{5}$
- e) 1

16. Simplify the expression  $\sec C \csc C - \tan C - \cot C$ .

- a)  $\tan C$
- b) 1
- c)  $\sec C$
- d) 0
- e)  $\cot C$

17. A ladder 22 ft long leans against a building. The ladder forms an angle of  $30^\circ$  with the ground. How high up the side of the building does the ladder reach?

- a) 11 ft
- b)  $11\sqrt{3}$  ft
- c) 22 ft
- d)  $\sqrt{11}$  ft
- e)  $22\sqrt{3}$  ft

18. Evaluate  $\sin 660^\circ$ .

a)  $\frac{\sqrt{6}}{6}$

b)  $-\frac{\sqrt{6}}{2}$

c)  $-\frac{\sqrt{3}}{2}$

d)  $\frac{\sqrt{3}}{2}$

e)  $-\frac{1}{6}$

19. Which one of the following expressions is equal to  $\frac{\cos \theta \csc \theta}{\cot \theta}$ ?

a)  $\csc \theta - 3 \cot \theta$

b)  $3 \cot \theta$

c) 1

d)  $\csc \theta + 3 \cot \theta$

e) 3

20. Simplify  $(\cos \theta - \sin \theta)^2 - 2 \sin \theta \cos \theta$ .

a)  $-4 \sin \theta \cos \theta$

b) 1

c)  $1 + 4 \sin \theta \cos \theta$

d)  $1 - 4 \sin \theta \cos \theta$

e)  $4 \sin \theta \cos \theta$