

The following 19 multiple choice questions are worth 5 points each.

1. Solve for z : $m = \frac{x}{y-z}$

a. $z = \frac{my-m}{x}$

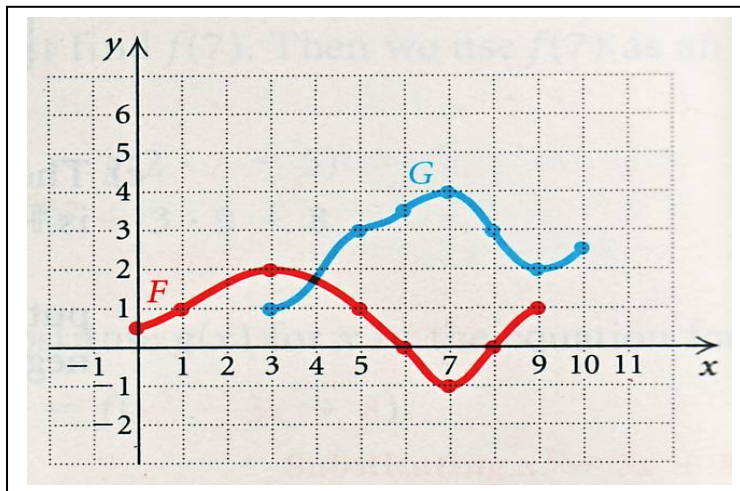
b. $z = \frac{y-x}{m}$

c. $z = \frac{my-x}{m}$

d. $z = \frac{m-x}{y}$

e. $z = -\frac{x}{my}$

2. Which of the following is/are true regarding the functions F and G ?



I. F is increasing on the intervals $\left[\frac{1}{2}, 2\right] \cup [-1, 1]$.

II. The solution of $F(x) < 0$ is $(6, 8)$.

III. There are two solutions of the equation $G(x) = 3$.

IV. $(F \circ G)(8) = 3$.

a. Only I and IV are true

c. Only I and II are true

b. Only II, III and IV are true

d. Only II and III are true

e. Only I, II and III are true

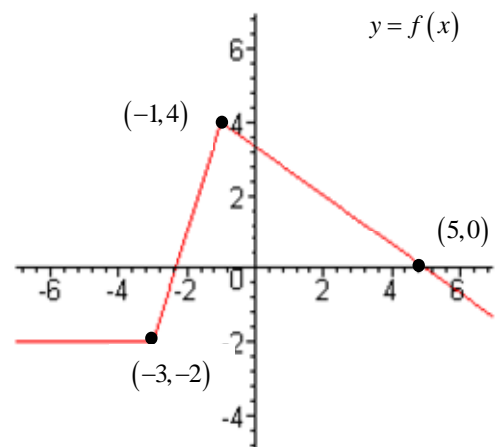
3. Write the equation of the line that contains the point $(3, -2)$ and is perpendicular to the line $3x + 4y = 5$. The y -intercept of the line you found is:
- $(0, -6)$
 - $(0, 2)$
 - $\left(0, \frac{5}{4}\right)$
 - $\left(0, \frac{8}{9}\right)$
 - $\left(0, -\frac{8}{9}\right)$
4. Let $h(x) = \sqrt{6x+1}$. Find functions f and g such that $(f \circ g)(x) = h(x)$.
- $g(x) = \sqrt{6x}$; $f(x) = x+1$
 - $g(x) = x+1$; $f(x) = \sqrt{6x}$
 - $g(x) = \sqrt{x+1}$; $f(x) = 6x$
 - $g(x) = 6x$; $f(x) = \sqrt{x+1}$
 - $g(x) = \sqrt{x}$; $f(x) = 6x+1$
5. If $f(x) = 3x^2 + x$, determine and simplify the difference quotient: $\frac{f(x+h) - f(x)}{h}$
- 1
 - $\frac{6xh + 3h^2 + 2x + h}{h}$
 - $\frac{2x + h}{h}$
 - $6x + 3h + 1$
 - $\frac{6x^2 + 3h^2}{h}$

6. Determine which of the following is equivalent to: $\frac{2}{y+3} - \frac{y}{y-1} + \frac{y^2+2}{y^2+2y-3}$
- $\frac{y^2 - y + 4}{y^2 + 2y - 3}$
 - $\frac{-1}{2y - 3}$
 - $\frac{2y + 4}{y^2 + 2y - 3}$
 - $\frac{5y}{y^2 + 2y - 3}$
 - $\frac{-y}{y^2 + 2y - 3}$
7. Write a polynomial function, $p(x)$, whose only real zeros are -1 and 5 with multiplicities 4 and 2 respectively, and for which $p(1) = 6400$.

- $p(x) = 25(x-1)^4(x+5)^2$
- $p(x) = 25(x+1)^4(x-5)^2$
- $p(x) = (x+1)^4(x-5)^2$
- $p(x) = -25(x+1)^4(x-5)^2$
- $p(x) = -25(x-1)^4(x+5)^2$

8. The graph of $y = -f(x+3)$ is obtained from the graph of $y = f(x)$ shown below. Under this transformation the point $(-3, -2)$ will be translated to what point?

- $(-6, 2)$
- $(-4, -4)$
- $(0, 2)$
- $(3, 1)$
- $(-3, 2)$



9. Let $f(x) = \frac{6x+5}{2-3x}$. Find $f^{-1}(x)$.

a. $f^{-1}(x) = \frac{x-5}{3x+3}$

b. $f^{-1}(x) = \frac{x+5}{6}$

c. $f^{-1}(x) = \frac{2x-5}{3x+6}$

d. $f^{-1}(x) = \frac{5-6x}{3x-2}$

e. $f^{-1}(x) = \frac{2-3x}{6x+5}$

10. Solve the following system of equations:
$$\begin{cases} y = 3^{2x} \\ y = 5(3^x) + 6 \end{cases}$$

The x -coordinate of the solution is:

a. $\frac{\ln 3}{\ln 6}$

b. $\frac{\ln 6}{\ln 3}$

c. $\frac{\ln 5 - \ln 3}{\ln 6}$

d. $\frac{\ln 5}{\ln 3}$

e. $\ln 3 - \ln 6$

11. If $\log_b 2 = C$ and $\log_b 3 = D$, determine which of the following is equivalent to $\log_b 24$.

a. $3C + \frac{1}{3}D$

b. $3C + D$

c. $\frac{1}{3}C + D$

d. $\frac{1}{3}(C + D)$

e. $C^3 + D$

12. Which of the following is/are true?

I. $\log_7 534 \approx 3.23$

II. $\log_2(x+5) = \log_2 x + \log_2 5$

III. $(x-2)\ln t = x\ln t - 2\ln t$

- a. Only I and II are true. c. Only II and III are true
b. Only I and III are true. d. Only I is true
e. All are true

13. Let $\theta = \frac{4\pi}{3}$. Which of the following is/are true?

I. The reference angle $\theta' = \frac{\pi}{6}$

II. $\sin \theta = \frac{\sqrt{3}}{2}$

III. $\cot \theta = -\frac{\sqrt{3}}{3}$

- a. None are true.
b. Only II and III are true.
c. Only III is true.
d. Only II is true.
e. Only I is true.

14. A woman is driving directly toward the Gateway Arch in St. Louis, which is 630 feet high. She drives along a level road from a point at which the angle of elevation to the top of the arch is 40° , to a point where the angle of elevation to the top of the arch is 60° . To the near foot, how far has she driven?

- a. 647 feet
b. 426 feet
c. 583 feet
d. 532 feet
e. 387 feet

15. Use the triangle to express $\sec \theta$ in terms of x .

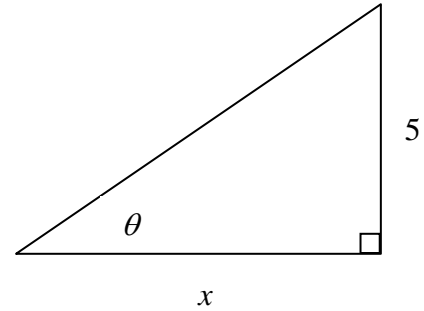
a. $\frac{5}{\sqrt{x^2 + 25}}$

b. $\frac{x}{\sqrt{x^2 + 25}}$

c. $\frac{\sqrt{x^2 + 25}}{x}$

d. $\frac{x}{x+5}$

e. $\frac{x+5}{5}$



16. Determine which of the following is equivalent to $\frac{\cos x}{1 + \sin x} + \frac{\cos x}{1 - \sin x}$.

a. $\frac{2}{\cos^2 x}$

b. $2 \cos x$

c. $2 \cos^2 x$

d. $\frac{2}{\cos x}$

e. None of the preceding

17. Determine which of the following is equivalent to: $\cot \theta \sin 2\theta$

a. $\cot \theta (\sin \theta + \sin \theta)$

b. $2 \tan \theta$

c. $2 \cos \theta$

d. $2 \cos^2 \theta$

e. $\cos \theta \sin \theta$

18. Determine which of the following is equivalent to: $\sin\left(x + \frac{\pi}{3}\right)$

a. $\frac{\sqrt{3}\sin x + \cos x}{2}$

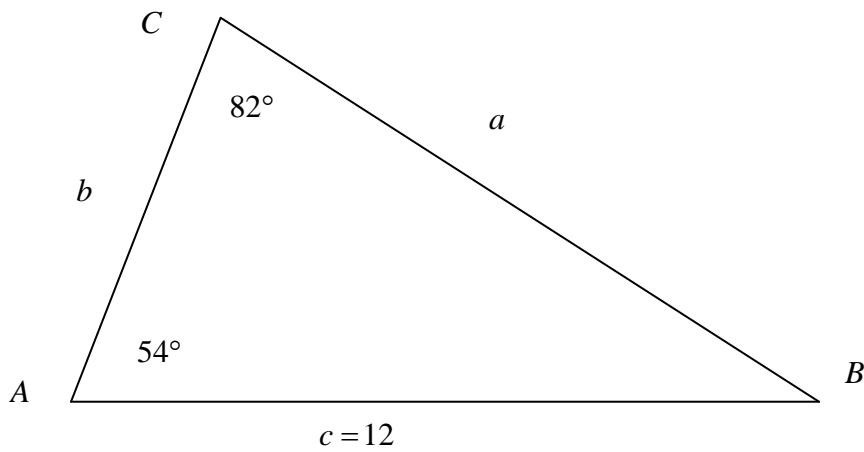
b. $\frac{\sin x + \sqrt{3}\cos x}{2}$

c. $\frac{2\sin x + \sqrt{3}}{2}$

d. $\sin x + \sin\frac{\pi}{3}$

e. $\frac{\sin x + \sqrt{3}\cos x}{4}$

19. In triangle ABC determine the length of side a .



a. 9.8

b. 8.4

c. 12.4

d. 17.1

e. 14.7