

# PRECALCULUS-CALCULUS

## READINESS EXAMINATION

### Test # 2

1. When  $a = 2$ ,  $b = -3$ , and  $c = 5$ , the value of the expression  $\frac{a^2 - b}{c^2 - b^2}$  is
- (a)  $\frac{1}{3}$                       (b)  $\frac{7}{34}$                       (c)  $\frac{7}{16}$                       (d)  $\frac{1}{16}$   
(e) None of the above.
2. The expression  $(-2a)(-4a^2b^3)^2$  simplifies to
- (a)  $16a^5b^6$                       (b)  $-32a^5b^5$                       (c)  $64a^6b^6$                       (d)  $-32a^5b^6$   
(e) None of the above.
3. The expression  $3x^2 + 5[4x^2 - 6(3x + 1)]$  simplifies to
- (a)  $23x^2 - 90x + 30$  (b)  $23x^2 - 90x + 5$  (c)  $23x^2 - 90x - 30$  (d)  $23x^2 - 18x + 1$   
(e) None of the above.
4. If  $2(x + 3) + x = 6\left(1 - \frac{1}{3}x\right)$ , then  $x$  is
- (a)  $\frac{3}{5}$                       (b)  $-\frac{3}{8}$                       (c) 0                      (d)  $\frac{1}{5}$   
(e) None of the above.
5. The expression  $\frac{\sqrt[4]{x} \sqrt[3]{x}}{x}$  simplifies to
- (a)  $x^{-5/12}$                       (b)  $x^{-8}$                       (c)  $x^{5/12}$                       (d)  $x^{19/12}$   
(e) None of the above.

6. The quotient  $\frac{(x+h)^2 - x^2}{h}$  simplifies to
- (a)  $h$                       (b)  $2x+h$                       (c)  $x+h$                       (d)  $2xh+h$   
(e) None of the above.
7. If  $-5x+1 < 5$ , then
- (a)  $x > -\frac{4}{5}$                       (b)  $x < -\frac{4}{5}$                       (c)  $x > -\frac{6}{5}$                       (d)  $x < -\frac{5}{4}$   
(e) None of the above.
8. If  $\frac{5}{3x-4} = \frac{1}{x-2}$ , then  $x$  is
- (a)  $-1$                       (b)  $3$                       (c)  $\frac{3}{4}$                       (d)  $1$   
(e) None of the above.
9. The quadratic expression  $x^2 - 7x + 10$  factors as
- (a)  $(x+2)(x+5)$  (b)  $(x-2)(x-5)$                       (c)  $(x+1)(x+10)$                       (d)  $(x-1)(x-10)$   
(e) None of the above.
10. The expression  $\frac{3x-4}{x^2-5x+6} - \frac{1}{x-3}$  simplifies to
- (a)  $\frac{2(x-1)}{(x-2)(x-3)}$  (b)  $\frac{2}{(x-2)}$                       (c)  $\frac{2(x-5)}{(x+2)(x-3)}$                       (d)  $\frac{2(2x-5)}{(x-2)(x-3)}$   
(e) None of the above.
11. The polynomial  $x^3 + 7x^2 + 6x$  can be factored as
- (a)  $x(x-1)(x-6)$                       (b)  $x(x-2)(x-3)$                       (c)  $x(x+2)(x+3)$   
(d)  $x(x+1)(x+6)$                       (e) None of the above.

12. The expression  $\frac{x^2 - 16}{x + 4} \cdot \frac{3x - 12}{x^2 - 8x + 16}$  simplifies to

- (a) 1                      (b) 0                      (c) 3                      (d)  $-\frac{3}{8x}$   
(e) None of the above.

13. The quadratic equation  $x^2 - x - 5 = 0$  is satisfied when  $x$  is

- (a)  $1 \pm \sqrt{6}$               (b)  $\frac{1}{2}(1 \pm \sqrt{21})$               (c)  $-\frac{1}{2}(1 \pm \sqrt{21})$               (d)  $\frac{1}{2}(1 \pm \sqrt{6})$   
(e) None of the above.

14. If  $|x - 2| \leq 5$ , then

- (a)  $3 \leq x \leq 7$               (b)  $-7 \leq x \leq -3$               (c)  $-3 \leq x \leq 7$               (d)  $-7 \leq x \leq 3$   
(e) None of the above.

15. One factor of  $9y^6 - 25x^2$  is

- (a)  $3y^3 + 5x$               (b)  $9y^4 - 5x$               (c)  $y^3 - 5x$               (d)  $3y^4 + 25x$   
(e) None of the above.

16. The inequality  $\frac{x - 2}{x + 5} > 0$  is satisfied when

- (a)  $x < -5$  only              (b)  $x < -5$  or  $x > 2$               (c)  $x < 2$  or  $x > 5$               (d)  $x > 2$  only  
(e) None of the above.

17. The expression  $\left(\frac{x^{12}y^{-3}}{z^{-3}}\right)^{-\frac{4}{3}}$  is equivalent to

- (a)  $x^{-16}y^{-4}z^4$               (b)  $x^{-16}y^4z^4$               (c)  $x^{16}y^4z^{-4}$               (d)  $x^{-16}y^4z^{-4}$   
(e) None of the above.

18. The slope of the line with equation  $3x + 4 = y - 5$  is

- (a)  $\frac{3}{5}$                       (b) 3                      (c)  $\frac{3}{4}$                       (d)  $-\frac{3}{5}$   
(e) None of the above.

19. A line with slope 3 and  $y$ -intercept 5 has the equation

- (a)  $y = 5x + 3$     (b)  $x = 5y + 3$                       (c)  $y = 3x + 5$                       (d)  $x = 3y + 5$   
(e) None of the above.

20. If  $(x, y)$  satisfies both of the equations  $3x + 4y = 9$  and  $3x - 4y = 6$ , then  $x$  is

- (a)  $\frac{5}{2}$                       (b)  $\frac{1}{2}$                       (c)  $\frac{3}{2}$                       (d)  $\frac{9}{2}$   
(e) None of the above.

21. If  $f(x) = 2 - 4x$ , then  $f(x - 2) + f(x) - 2$  is

- (a)  $14 - 8x$                       (b)  $10 - 8x$                       (c)  $-8x$                       (d)  $10 + 8x$   
(e) None of the above.

22. The largest set of real numbers in the domain of the function  $f(x) = \frac{1}{\sqrt{27 - x^3}}$  is

- (a)  $x < -3$                       (b)  $x \leq -3$                       (c)  $x < 3$                       (d)  $x \leq 3$   
(e) None of the above.

23. If  $f(x) = 2x - 3$  and  $g(x) = 8x^2$ , then the composition  $(f \circ g)(x) \equiv f(g(x))$  is

- (a)  $8x^2 - 3$                       (b)  $32x^2 - 96x - 72$                       (c)  $16x^2 - 3$                       (d)  $16x^3 - 24x^2$   
(e) None of the above.

24. The equation  $\frac{x^2 - 5x + 6}{x - 2} + x = 3$  is satisfied when  $x$  is

- (a) 3 only      (b) 2 or 3      (c) 0 only      (d) 2 or  $\frac{3}{2}$   
(e) None of the above.

25. The expression  $\frac{(2-x)(x+3) + (x+3)(x-4)}{(x+3)(2-x)}$  simplifies to

- (a)  $x^2 - x - 11$       (b)  $x^2 - x - 12$       (c)  $\frac{2}{x-2}$       (d)  $x - 3$   
(e) None of the above.

26. The distance between the points  $P(4, 7)$  and  $Q(-1, -5)$  is

- (a) 5      (b) 17      (c) 13      (d)  $\sqrt{13}$   
(e) None of the above.

27. For positive real numbers  $m$ ,  $n$ , and  $r$ , which of the following are true?

I.  $\log(mn) = (\log m)(\log n)$

II.  $\log\left(\frac{m}{n}\right) = \log m - \log n$

III.  $\log(m^r) = r \log m$

- (a) I, II, and III      (b) I and II      (c) I and III      (d) II and III  
(e) None of the above.

28. Suppose that  $2^{11}$  is approximately 2,000, which of the following best approximates  $2^{22}$ ?

- (a)  $(4,000)^{11}$       (b) 40,000      (c) 4,000,000      (d)  $(2,000)^{11}$   
(e) None of the above.

- 29.** A rectangle has a length that is 2 meters more than its width. What is the width of the rectangle if the perimeter of the rectangle is 52 meters?
- (a)  $-1 + \sqrt{53}$  meters (b) 25 meters (c) 14 meters (d) 12 meters  
 (e) None of the above.
- 30.** The volume of a sphere is proportional to the cube of its radius, and the surface area of a sphere is proportional to the square of the radius. Suppose the sphere  $S$  has a surface area that is 4 times the surface area of  $C$ . If the volume of  $C$  is 27, then the volume of  $S$  is
- (a) 108 (b) 162 (c) 216 (d) 243  
 (e) None of the above.
- 31.** The graph of  $y = \sin \frac{1}{3}x$ , for  $x$  in the interval  $[0, 3\pi]$ , crosses the  $x$ -axis at
- (a)  $0, \frac{3\pi}{2}$ , and  $3\pi$  (b)  $0$  and  $3\pi$  (c)  $\frac{3\pi}{2}$  only (d)  $0$  only  
 (e) None of the above.
- 32.** When the expression  $\sin t(\tan t + \cot t)$  is defined, it is equivalent to
- (a) 1 (b)  $\frac{1}{\sin t}$  (c)  $\frac{1}{\cos t}$  (d)  $(\sin t)^2 \cos t$   
 (e) None of the above.
- 33.** The solutions of the equation  $2 \cos x - \sqrt{2} = 0$  that lie in the interval  $[0, 2\pi]$  are
- (a)  $\frac{\pi}{4}$  and  $\frac{3\pi}{4}$  (b)  $\frac{\pi}{4}$  and  $\frac{5\pi}{4}$  (c)  $\frac{\pi}{4}$  and  $\frac{7\pi}{4}$  (d)  $\frac{3\pi}{4}$  and  $\frac{7\pi}{4}$   
 (e) None of the above.
- 34.** The value of  $\tan(t - \pi)$  is the same as the value of
- (a)  $\tan t$  (b)  $-\tan t$  (c)  $\cot t$  (d)  $-\cot t$   
 (e) None of the above.

- 35.** An open rectangular box has height 3 and a square base. The volume of the box is 48. The surface area of the box is
- (a) 32                      (b) 64                      (c) 80                      (d)  $24\sqrt[3]{6} + 8\sqrt[3]{36}$   
 (e) None of the above.
- 36.** In an isosceles right triangle two sides have length 7. The length of the hypotenuse is
- (a)  $7\sqrt{2}$                       (b)  $\frac{7\sqrt{3}}{2}$                       (c)  $\sqrt{14}$                       (d)  $7\sqrt{3}$   
 (e) None of the above.
- 37.** An angle of  $\frac{8\pi}{3}$  radians is the same as an angle of
- (a)  $480^\circ$                       (b)  $420^\circ$                       (c)  $240^\circ$                       (d)  $60^\circ$   
 (e) None of the above.
- 38.** A square  $R$  has perimeter 8. A new square  $S$  is formed from  $R$  by multiplying all the sides of  $R$  by 3. How much more area does  $S$  have than  $R$ ?
- (a) 8                      (b) 32                      (c) 36                      (d) 512  
 (e) None of the above.
- 39.** The equation  $x^2 + y^2 - 6x - 2y - 15 = 0$  describes a circle with
- (a) center  $(-3, -1)$  and radius 5                      (b) center  $(3, 1)$  and radius 5  
 (c) center  $(-3, -1)$  and radius 25                      (d) center  $(3, 1)$  and radius 25  
 (e) None of the above.
- 40.** The graph of the equation  $y = \frac{3x}{x^2 - 9}$  has a vertical asymptote whose equation is
- (a)  $x = 3$                       (b)  $y = 3$                       (c)  $x = 9$                       (d)  $y = -3$   
 (e) None of the above.