Stanislaus Mathematic Council
Level 4 – Algebra II Blitz 2015

1. If $x^2 - 2x + 9 = 0$ then $x =$

   a. $1 \pm 2\sqrt{2}$ b. $1 \pm 2i\sqrt{2}$ c. $1 \pm \sqrt{10}$

   d. $1 \pm 4i\sqrt{2}$ e. none of these

2. $\sum_{k=0}^{4} k! =$

   a. 33 b. 10 c. 34 d. 11

   e. none of these

3. If $log(x-7) - log(2x) = -1$ then $x =$

   a. $\frac{7}{3}$ b. 8.75 c. $\frac{-7}{19}$ d. -8

   e. none of these

4. The slope of any line perpendicular to the line described by $7x - 3y = 12$ is:

   a. $\frac{-3}{7}$ b. $\frac{7}{3}$ c. $\frac{3}{7}$ d. $\frac{-7}{3}$

   e. none of these

5. Variable A is directly proportional to variable B. When $B = 15$, $A = 5$. When $A = 35$, $B =$

   a. 105 b. $\frac{35}{3}$ c. 735 d. $\frac{15}{49}$

   e. none of these

6. $\frac{7}{2x+10} - \frac{1}{4x} =$

a. $\frac{13x-5}{4x^2+20x}$ b. $\frac{13x+5}{4x^2+20x}$ c. $\frac{6}{-2x+10}$

d. $\frac{6x-5}{4x(x+5)}$ e. none of these

7. If $i = \sqrt{-1}$ then $-3i(4-7i) - 5(3-2i) =$

a. $-36-22i$ b. $6-2i$ c. $-27+22i$

d. $36-2i$ e. none of these

8. $\frac{8x^3+125}{2x+5} =$

a. $4x^2+25$ b. $4x^2-20x+25$

c. $4x^2+10x+25$ d. $4x^2-10x+25$

e. none of these

9. If $i = \sqrt{-1}$ then $i^{137} =$

a. i b. 1 c. -1 d. $-i$

e. none of these

10. The equation $7x^2+2x-3 = 5y^2+8y$ describes:

a. a circle b. a line c. an ellipse

d. a parabola e. none of these

11. $log_3\left(\sqrt[17]{81}\right) =$

a. 4.25 b. $\frac{4}{17}$ c. 17.3

d. $log_3(17) - 4$ e. none of these

12. $\frac{10}{\sqrt{3}-\sqrt{7}} =$

a. $10\sqrt{3} - 10\sqrt{7}$ b. $5\sqrt{3} - 5\sqrt{7}$ c. 2

d. $\frac{5\sqrt{3}+5\sqrt{7}}{2}$ e. none of these

13. The solution set to the inequality $\frac{x+2}{x} \leq \frac{x+1}{x-3}$ is:

a. $(-3, \infty)$ b. $[-3, \infty)$ c. $[-3, 0] \cup [3, \infty)$

d. $[-3, 0) \cup (3, \infty)$ e. none of these

14. $\sum_{k=0}^{\infty} \frac{3}{5^k} =$

a. $\frac{3}{4}$ b. does not converge c. $\frac{15}{4}$

d. $\frac{15}{2}$ e. none of these

15. $\sqrt{-49} \bullet \sqrt{-4} =$

a. 14 b. $14i$ c. -14

d. 3.5 e. none of these

16. The vertex of the parabola described by $2y^2 - x = 12y - 13$ is:

a. $(3, -5)$ b. $(-5, 3)$ c. $(67, -3)$

d. $(13, 0)$ e. none of these

17. If $x > 5$ then $\frac{ln(x^2-25)}{ln(x-5)} =$

a. $x + 5$ b. $ln(x + 5)$ c. $x^2 - x - 20$

d. $ln(x^2 - x - 20)$ e. none of these

18. The equation of the line passing through $(-3, 5)$ with slope $\frac{-3}{4}$ is:

a. $4x + 3y = 3$ b. $3x + 4y = 11$ c. $3x - 4y = 11$

d. $4x - 3y = 3$ d. none of these

19. If $x \neq 0$ then $\frac{\sqrt[4]{x^3}}{\sqrt{x^5}} =$

a. $\frac{1}{\sqrt{x^2}}$ b. $\sqrt[4]{x^2}$ c. $\frac{1}{\sqrt[4]{x^2}}$

d. $\frac{\sqrt[4]{x}}{x^2}$ e. none of these

20. The height (h) of a projectile t seconds after lift-off is given by the formula $h(t) = 200t - 16t^2 + 500$ The time, in seconds, that it takes to get to its highest point is:

a 6.25 b. 2.5 c. 12.5

d. 31.25 e. none of these

21. The solution set for the equation $|3x - 5| = -8$ is:

a. $\{-1\}$ b. $\{-1, \frac{13}{3}\}$ c. ϕ

d. $\{1\}$ d. none of these

22. If $ln(3x - 5) = 2$, then $x =$

a. $\frac{7}{3}$ b. $\frac{5e^2}{3}$ c. $\frac{e^2-5}{3}$

d. there is no real solution e. none of these

23. If $f(x) = 2x^3 - 5$ then $f^{-1}(x) =$

a. $\frac{1}{2x^3-5}$ b. $\sqrt{\frac{x+5}{2}}$ c. $5 - 2x^3$

d. $\sqrt[3]{\frac{x+5}{2}}$ e. none of these

24. The center of the circle described by the equation $x^2 + 10y + y^2 + 20 = 6x$ is

a. $(-5, 3)$ b. $(5, -3)$ c. $(3, -5)$

d. $(-5, -3)$ e. none of these

25. The domain of the function $g(x) = \sqrt{7 - 5x}$ is:

a. $(-\infty, 1.4]$ b. $[1.4, \infty)$ c. $(-\infty, \frac{5}{7}]$

d. $[\frac{5}{7}, \infty)$ e. none of these

26. The solution set for the equation $\sqrt{2x-9} = x - 12$ is

a. $\{17, 9\}$ b. $\{9\}$ c. $\{17\}$

d. ϕ e. none of these

27. The solution for the system of equations

$$2x + 3y = 1$$
$$3x + 2y = -11$$

is the point:

a. $(-7, 5)$ b. $(7, -5)$ c. $(\frac{-16}{5}, \frac{19}{5})$

d. $(8, -5)$ e. none of these

28. $\frac{x^{-2}y^3 - xy^{-4}}{x^5y^{-1} + x^{-4}y} =$

a. $x^{-7}y^4 - x^5y^{-5}$ b. $\frac{y^7 - x^3}{x^9 + y^2}$ c. $x^2y^2 - x^5y^{-6}$

d. $\frac{x^2y^7 - x^5}{x^9y^3 + y^5}$ e. none of these

29. If a circle has the points $(-3, 4)$ and $(9, -1)$ on diameter, then the radius of the circle is:

a. 13 b. $\sqrt{17}$ c. 6.5

d. 9 e. none of these

30. The domain of $y = \sqrt{\frac{x^2 - 3x - 10}{2 - x}}$ is:

a. $(-\infty, -2] \cup [2, 5]$ b. $(-2, 2) \cup (5, \infty)$

c. $[-2, 2) \cup [5, \infty)$ d. $(-\infty, -2] \cup (2, 5]$

e. none of these

31. If $g(x) = \frac{x}{x-3}$ then $g^{-1}(x) =$

a. $\frac{x-3}{x}$ b. $\frac{-3x}{1-x}$ c. $\frac{x+1}{3x}$

d. $\frac{1-x}{3x}$ e. none of these

32. The equation $x^4 = 10x^2 + 119$ has:

a. four real solutions b. four imaginary solutions

c. two real and two imaginary solutions.

d. no solutions e. none of these

33. $\frac{x^3+8}{x^2-4} \bullet \frac{14-7x}{35} =$

a. $\frac{-x^2+2x-4}{5}$ b. $\frac{x^2+2x+4}{5}$ c. $(x-2)(7x-5)$

d. $\frac{x^2-2x+4}{5}$ e. none of these

34. If x and y are any real numbers then $\sqrt{98\,x^{17}\,y^2} =$

a. $7x^8y\sqrt{2x}$ b. $7x^4y\sqrt{2x}$ c. $7\,x^8\sqrt{2xy}$

d. $2x^8y\sqrt{2x}$ e. none of these

35. The solution to the equation $\frac{1}{y+3} + \frac{1}{y-3} = \frac{1}{y^2-9}$ is

a. $y = \frac{-1}{2}$ b. $y = 2$ c. $y = \frac{1}{2}$

d. $y = 1$ d. none of these

36. The x coordinates of the $x-intercepts$ of the graph of $y = 7x^2 - 17x + 5$ are

a. both positive
b. both negative
c. one positive and one negative
d. one positive
e. none of these

37. The range of the relation described by $\frac{(x-3)^2}{25} + \frac{(y+2)^2}{9} = 1$ is:

a. $[-2, 8]$
b. $[-1, 5]$
c. $[-7, 3]$
d. $[-5, 1]$
e. none of these

38. If $\frac{1}{a} = \frac{1}{b} + \frac{1}{c}$ then $b =$

a. $\frac{ac}{a-c}$
b. $b + c$
c. $\frac{c-a}{ac}$
d. $\frac{-ac}{a-c}$
e. none of these

39. The intensity (I) of a television signal varies inversely with the square of the distance (d) from the transmitter. At a distance of two kilometers from the transmitter the intensity is measured at 25 W/M^2. Calculate the intensity of that same signal at a distance of 2.5 kilometers away.

a. 40 W/M^2
b. 20 W/M^2
c. 16 W/M^2
d. 39.06255 W/M^2
e. none of these

40. In a right triangle the measure of angle A is five degrees less than three times the measure of angle B. The measure of angle B is:

a. 23.75 degrees
b. 66.25 degrees
c. 46.25 degrees
d. not enough information is given
e. none of these

41. The solution set for the inequality $|-2x+7| \geq 13$ is:

a. $(-\infty, -3] \cup (10, \infty)$ b. $(-\infty, -3] \cup [10, \infty)$

c. $(-\infty, -10] \cup [3, \infty)$ d. $[-3, 10]$

e. none of these

42. Which of the following points is NOT included in the solution to the system of inequalities: $x + 2y \leq 5$ and $3x - y \geq 4$.

a. $(0, -6)$ b. $(2.1, -3.2)$ c. $(5.3, -0.87)$

d. $(1.25, 0.75)$ e. none of these

43. $5\sqrt[3]{24} - 2\sqrt[3]{-135} =$

a. 0 b. $10\sqrt[3]{3} - 6\sqrt[3]{5}$ c. $10\sqrt[3]{15}$

d. $10\sqrt[3]{3} + 6\sqrt[3]{5}$ e. none of these

44. The point that is one-fourth of the way from $(-4, 3)$ to $(12, -7)$ is:

a. $(0, 0.5)$ b. $(4, -2)$ c. $(8, -4.5)$

d. $(0.5, 0)$ e. none of these

45. The solution to $9^{3x+5} = 27^{x-2}$ is $x =$

a. $\frac{16}{3}$ b. $\frac{-7}{2}$ c. $\frac{-16}{3}$

d. $\frac{2}{7}$ e. none of these