February Algebra 2 Individual Solutions

1. $y^2+4y+8x+28=0$ means $(y+2)^2= -8(x+3)$. The vertex is (-3, -2), a=2. x = -1 A
2. $\sqrt{xy} = 10$ so xy=100. The possibilities are (1,100), (2,50), (4,25), (5,20), (10,10) C
3. h(f(g(0)))=h(f(4))=h(16+3)=h(19)=38. B
4. f(-3)=52, f(4)=-25, m=(52+25)/(-3-4)=77/-7=-11 E
5. We can rewrite the equations as: y=C/B – A/Bx and y=F/E – D/Ex. We must have D/E=A/B, but not necessarily I or II. To be distinct, we need C/B≠F/E, not III. E
6. All logarithmic graphs pass through the point (1,0). 0/1=0. A
7. *r* has equation y=3x+2, and *s* has equation y= -5x+4. When 3x+2=-5x+4, x=1/4. E
8. They intersect at (2,2) and (-2,2). Considered as 2 triangles, A=2(1/2)(8)(2)=16 D
9. The 1st determinant,(3)(8)(9)+(4)(-5)(1)+(0)(2)(0)-(1)(8)(0)-(0)(-5)(3)-(9)(2)(4)=124 B
10. $f(x=4+\sqrt{3})=0=(4+\sqrt{3})^2 +a(4+\sqrt{3}) + b=(19+4a+b)+(a+8)\sqrt{3}$. So a=-8 and b=13. D
11. $5^x=13$ so $x = \log_5(13) = \log(13)/\log(5) = 1.594$ D
12. The range of $g(x)=x^2+1$ is $[1, \infty)$. The range of $f(x)=\sqrt{x^2+1}$ is also $[1, \infty)$ D
13. The equation $x^3 -1 = (x-1)(x^2+x+1)=0$ has 3 complex roots. We know that $z\neq1$, so z must be a root of x^2+x+1 . I is true. II is true because a number's complex conjugate is always another root of a polynomial with real coefficients. III is false because z is non-real, so if z^2 were real then $zz^2 =z^3 =1$ would be non-real. B
14. The roots of f(x) are $(1+i\sqrt{2})/3$ and $(1 - i\sqrt{2})/3$. $d=2\sqrt{2}/3$ B
15. g(x) has a double root at 0. $h(x)=3+x+x^5$ crosses the x-axis somewhere, but has no negative real roots and by Descartes' Sign Rule, it has at most 1 positive real root. B
16. $x^4-2x^3+7x-4 = (x^2-3x+4)(x^2+x-1)$ The discriminants of these are –7 and 5. C
17. $y=e^{2(0)}-1=1-1=0$ D
18. The two circles described are internally tangent, and intersect at the point (1,0). B
19. $e^{x+4}+1-e^{3x^2} = 1$ so $e^{x+4} = e^{3x^2}$, and $3x^2=x+4$ The solutions are x=4/3 and x=-1.E
20. To get a 5, you need to roll a 1,1,3 or a 1,2,2. The probability of rolling either one is $(1/6)^3(3)=1/72$, and 2(1/72)=1/36. B
21. $\frac{1}{a}+\frac{1}{a^2}+\frac{1}{a^4}+\frac{1}{a^6}+\ldots=\frac{1}{a}+\sum_{i=1}^{\infty}\frac{1}{a^{2i}}=(\frac{1}{a^2})/(1-\frac{1}{a^2}) = \frac{a^2+a-1}{a^3-a}$. C
22. $\frac{4+i}{-6+4i}\frac{-6-4i}{-6-4i}=\frac{-10-11i}{26}$ A
23. If the eccentricity is greater than 1, then the conic is a hyperbola. B
24. $9x^7+3x^5-6=3(3x^7+x^5-2)$, so the possible roots are +/-1, +/-2, +/-1/3, +/-2/3. D
25. This is a direct application of Cramer's Rule. D
26. The first person gave 400+(-12)(29)=52 ,Total=(1/2)30(400+52)=6780 B
27. $\begin{vmatrix} 6-x & -3 \\ 1 & 2-x \end{vmatrix}=(6-x)(2-x)-(-3)=12-8x+x^2+3=x^2-8x+15=(x-3)(x-5)=0$ D
28. $x^2 + y^2+6x-4y-563=x^2+6x+9+y^2-4y+4-576=(x+3)^2+(y-2)^2-576=0$ $\sqrt{576}=24$ B
29. Note that $A^2 =\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ and in general $A^n =\begin{bmatrix} 1 & n \\ 0 & 1 \end{bmatrix}$. a+b+c+d=1+58+0+1=60 E

30. Matrix multiplication is associative and distributive, but not commutative. A