1. B
2. A
3. B
4. D
5. A
6. A
7. B
8. C
9. D
10. C
11. C
12. C
13. B
14. B
15. A
16. D
17. A
18. D
19. D
20. C
21. D
22. A
23. D
24. A
25. D
26. B
27. C
28. B
29. B
30. A

1. B $$\frac{AC^2D}{B^3}=\frac{2\left(4^2\right)(10)}{2^3}=\frac{A\left(3^2\right)(6)}{3^3}\rightarrow A=20$$

2. A $$\begin{array}{r} x^3-x+\frac{3x+1}{x^2+2} \\ x^2+2\overline{\smash{)}\,x^5+x^3+x+1} \end{array}\rightarrow A=0,B=1,D=-1,F=3,G=1\rightarrow -3$$

3. B $$\begin{pmatrix} 2 & 8 & 5 \\ 3 & 4 & -2 \\ -7 & 5 & 1 \end{pmatrix}\rightarrow 8+112+75-\left(-140-20+24\right)=195--136=331\rightarrow 3$$

4. D Using areas we can set up some equations RFL-8=MFR-LRF 2RFL-8=MFR. MRF is half the area of the rectangle and therefore equal to MUF+RFL. Sp RFL =16 and MRF =24

5. A The horizontal is y = 0. The vertical is x = 3. To find the slant, just divide the denominator into the numerator and ignore the remainder. Set this equal to y to get the slant asymptote and you get y = -x. Draw a picture of these three lines and you get:
$$\frac{1}{2}(3)(3)=\frac{9}{2}$$

6. A The slope from the point (-4,3) to the origin is $\frac{-3}{4}$. The slope of the tangent line is the negative reciprocal of this. In Standard Form that gives us 4X – 3Y = C. Plug in the given point and the answer is: 4X – 3Y = -25

7. B Draw a triangle with a line parallel to the base.
$$V=\frac{1}{3}Bh=250\rightarrow 5B=250\rightarrow B=50$$
If the area of the base is 50 then a side of the base is $5\sqrt{2}$. We can now set of similar triangles: $\frac{9}{15}=\frac{x}{\frac{5\sqrt{2}}{2}}\rightarrow 5x=\frac{15\sqrt{2}}{2}\rightarrow x=\frac{3\sqrt{2}}{2}$
$$\frac{1}{3}(9)\left(3\sqrt{2}\right)^2=54\rightarrow 250-54=196\rightarrow 196-54=142$$

8. C Transform the equation into an easier form for answering this question. 2p is the distance from the focus to the directrix
$$y^2-4y+4=-8x+28+4\rightarrow\left(y-2\right)^2=-8x+32$$
$$\left(y-2\right)^2=-8\left(x-4\right)\rightarrow 4p=8\rightarrow 2p=4$$

9. D Plug in 1, 2 and 3 to get 3 equations with 3 variables:
$$-3=A+B+C\rightarrow -2=4A+2B+C\rightarrow 3=9A+3B+C$$
$$1=3A+B\rightarrow 5=5A+B\rightarrow 4=2A\rightarrow A=2\rightarrow B=-5\rightarrow C=0\rightarrow 2--5-0=7$$

10. C $100x+10y+z=100z+10y+x\rightarrow 99(x-z)=0$. X and Y can be anything from 1-9 so 9 possibilities.

11. C Draw a picture and you see that WUZ is isosceles so UZ =24. The altitude creates a 30-60-90 in FUZ and a 45-45-90 in FLU. So we get

$$12\sqrt{3}+12\sqrt{3}+24+12=36+24\sqrt{3}\rightarrow 36-24=12$$

12. C $\sqrt{(x-6)^2+\left(\sqrt{x-2}-0\right)^2}=\sqrt{x^2-11x+34}=\sqrt{\left(x-\frac{11}{2}\right)^2+\frac{15}{4}}\rightarrow\frac{\sqrt{15}}{2}$

13. B $-2<2x^2+5x-5<2\rightarrow 2x^2+5x-5<2\rightarrow 2x^2+5x-7<0$

$$(2x+7)(x-1)<0\rightarrow\frac{-7}{2}<x<1\rightarrow -2<2x^2+5x-5\rightarrow 0<2x^2+5x-3$$

$$(2x-1)(x+3)>0\rightarrow(-\infty,-3)\cup\left(\frac{1}{2},\infty\right)\cap\frac{-7}{2}<x<1\rightarrow\left(-\frac{7}{2},-3\right)\cup\left(\frac{1}{2},1\right)$$

14. B From Descartes rule of signs we get: -+- - +. So we have 3 sign changes which means 3 or 1 negative roots. If you graph some negatives it is easy to see you go from (0,3) to (-1,-9) the negative outputs only get bigger so we have one negative root between 0 and -1

15. A $8+2x-x^2=-\left(x^2-2x-8\right)=-(x-4)(x+2)\rightarrow -2\le D\le 4$ -5-4-…+0+1=-14

$$-5\le R\le 1\rightarrow 7$$

16. D $6-x+x+9=15$

17. A $\frac{3}{5}(600)=360=U\rightarrow L-U=\frac{2}{5}(360)=144$

18. D All are different. The first is a line. The 2nd a line with a hole and the third is 2 lines

19. D Draw picture and connect perpendiculars from center of circle to J and F. This creates a kite with angles of 90,90,32, and central angle of 148. WJF is half this angle because it is an inscribed angle so answer 74.

20. C Sum of roots is 6 and since only 1 real they must be of the form 2-bi, 2, and 2+bi. Plug in 2 and you get 8-24+42-k=0 k=26 so 2+6=8

21. D $9x=y^{-3}\rightarrow x^{-3}=y^3\rightarrow 9x=x^3\rightarrow x^2=9$

$$\frac{x}{y}=\frac{x}{x^{-1}}=x^2=9$$

22. A $2x+9+x+1+2\sqrt{2x^2+11x+9}=x+4$

$-2x-6=2\sqrt{2x^2+11x+9}\rightarrow -x-3=\sqrt{2x^2+11x+9}$ both are extraneous so no

$x^2+6x+9=2x^2+11x+9\rightarrow x^2+5x=0\rightarrow x=-5,0$

solutions

23. D Base equal 1 gives (5,1). Base equals -1 and exponent equals an even gives (-1,7). Exponent equals zero gives (3,3) and (4,2). So5+7+3+4=19

24. A choose 3 of the remining 8 to be with Jason and then double because those 3 could be with Lu as well $2{}_8C_3=\frac{2\bullet 8\bullet 7\bullet 6}{3\bullet 2\bullet 1}=112$

25. D The altitude to the hypotenuse is the geometric mean of the 2 segments,so:

$$a^2 = 2x^2 + x^2$$

$$b^2 = 2x^2 + 4x^2 \rightarrow \frac{a^2}{b^2} = \frac{3x^2}{6x^2} \rightarrow \frac{a}{b} = \sqrt{\frac{1}{2}} = \frac{\sqrt{2}}{2}$$

26. B If the 3rd and 5th are the same, then n=6. So, the 4th term is coefficient is $-{}_6C_3 = -20$

27. C Call RS=x $\frac{x}{15} = \frac{12}{x+8} \rightarrow x^2 + 8x - 180 = 0 \rightarrow (x+18)(x-10) = 0 \rightarrow x = 10$

28. B $11^5 \bullet 20^4 \rightarrow 11^5 \bullet 2^8 \bullet 5^4$

$$11^3 \bullet 2^6 \bullet 5^3 \rightarrow A \bullet B^2 \bullet C \rightarrow 2 \bullet 3 \bullet 2 = 12$$

29. B start with (20,0) every time x goes down by 5 y goes up by 101. Last one is (0,404) for a total of 5.

30. A $4^{2x+1} - 3 \bullet 4^{x+1} = -5 \rightarrow 4\left(4^{2x}\right) - 12\left(4^x\right) + 5 = 0$

$$4^x = y \rightarrow 4y^2 - 12y + 5 = 0 \rightarrow (2y-1)(2y-5) = 0$$

$$y = \frac{1}{2}, \frac{5}{2} \rightarrow 2^{2x} = 2^{-1} \rightarrow x = \frac{-1}{2}$$