1. D Undefined. Common ratio is greater than 1 in absolute terms
2. C $\frac{K^{K-3}}{K}=\frac{K}{K^{\frac{4}{K}}}\rightarrow K^{K-4}=K^{1-\frac{4}{K}}\rightarrow K^{\left(K+\frac{4}{K}-5\right)}=1$ base is 1 or exponent is 0 or base is -1

   $4,-1,1\rightarrow 3$

   and exponent is even
3. B $2xy-14x-6y+42=2xy-5x+2y-5$

   $47=9x+8y\rightarrow\frac{-9}{8}$
4. C You can keep recycling 193 with one remaining digit at the end which could be 8 as a maximum
5. D $L+\sqrt{U}$ must equal a perfect square (16,9,4). U must also be a perfect square (1,4,9,16,25,36). A quick check gives 10 possibilities (8,1), (7,4), (6,9), (5,16), (4,25), (3,36), (10,36), (3,1), (2,4), (1,9)
6. C The intersection points are (5,-2), (10,0), and (-2,12). Shoe string from here:

   $120+4-\left(-20+60\right)=84\rightarrow\frac{84}{2}=42$
7. C $\frac{1}{2}\bullet 3h\left(7+x\right)+\frac{1}{2}4h\left(x+10\right)=\frac{1}{2}\bullet 7h\left(7+10\right)$

   $21+3x+4x+40=119\rightarrow 7x=58\rightarrow x=\frac{58}{7}\rightarrow 58$
8. C Rearrange to have going in the same direction. The first number in common is 19 and every 12 will produce another common number. 19+12(9)=127 so 10 numbers
9. D $\frac{2023}{4}>\frac{L+U}{L}>\frac{2023}{5}\rightarrow\frac{2019}{4}>\frac{U}{L}>\frac{2018}{5}\rightarrow 403\frac{3}{5}<\frac{U}{L}<504\frac{3}{4}$

   $404\le x\le 504\rightarrow 101$
10. C The 2nd part I would use the identity: $1-2\sin^2 x=\cos 2x$. On the first part I would draw a triangle in quadrant 2. $1-2\left(\frac{1}{6}\right)^2+\frac{-5}{12}=\frac{34-15}{36}=\frac{19}{36}$
11. A Expansion begins with $(9x)^{1/2}+(1/2)(9x)^{-1/2}(-y)-(1/8)(9x)^{-3/2}(-y)^2$. The third term therefore has a coefficient of -1/216.
12. C $1+\frac{2}{4}+\frac{3}{16}+...\rightarrow\frac{1}{1-\frac{1}{4}}=\frac{4}{3}\rightarrow\frac{\frac{4}{3}}{1-\frac{1}{4}}=\frac{16}{9}$
13. C Easy to factor if you play with it a little $\left(3x-2y+2\right)\left(2x-5y+1\right)\rightarrow n=-2$
14. B I would break the figure up into a triangle and a rectangle

    $\frac{1}{2}\bullet 2F\left(F-W\right)+2F\bullet 2W=253\rightarrow F^2+3FW=253$

    $F\left(F+3W\right)=253\rightarrow F=11\rightarrow W=4$

15. B $\cos x\cos y+\sin x\sin y=\frac{3}{5}\bullet\frac{-15}{17}+\frac{4}{5}\bullet\frac{8}{17}=\frac{-13}{85}$

16. B $y=\frac{-5}{3}x+b\ \ y=-4x+b$

$y=\frac{-5}{3}x+\frac{34}{3}\ \ y=4x+17\rightarrow(-1,13)\rightarrow 12$

17. A $2\begin{vmatrix}3 & 1 & 4\\ 5 & 1 & -1\\ 4 & -1 & -5\end{vmatrix}=2\begin{vmatrix}7 & 0 & -1\\ 9 & 0 & -6\\ 4 & -1 & -5\end{vmatrix}=2\bullet 1\begin{vmatrix}7 & -1\\ 9 & -6\end{vmatrix}=2(-42+9)=2(-33)=-66$

18. A $x^{\frac{4}{3}}-45x^{\frac{2}{3}}+324=0\rightarrow\left(x^{\frac{2}{3}}-9\right)\left(x^{\frac{2}{3}}-36\right)\rightarrow x^{\frac{2}{3}}=9,36$ your 4 solutions will have 2 negations of each other and the sum will be zero

19. D $-7=A+B+C+D$ $1=7A+3B+C$ $8=12A+2B$

$-6=8A+4B+2C+D$ $9=19A+5B+C$ $14=18A+2B$ $6A=6$

$3=27A+9B+3C+D$ $23=37A+7B+C$

$26=64A+16B+4C+D$

$A=1,\ B=-2,\ C=0,\ D=-6\rightarrow 1--2-0--6=9$

20. B $4\pi=12.566.\ 4\pi-11.6=.966\sim.97$

21. C $\frac{\cot x\sin x\left(\sin^2 x+\cos^2\right)\csc x}{\sec x\left(\sec^2 x-\tan^2 x\right)\cos x}=\frac{\cot x}{\sec x\left(\sec^2 x-\tan^2 x\right)\cos x}=\cot x$

22. B Definition of an ellipse. Set of points such that the sum of the distance from 2 points is constant. Note that $c=\sqrt{2}/2$ is less than $a=1$

23. B You can pass out 8 correctly or all 10 but not 9. All 10 is one case and 8 of 10 is ${}_{10}C_2=45$ so 45+1=46

24. D Draw picture and find base of the triangle using trapezoid area formula and then use similar triangles $\frac{1}{2}\bullet 10(10+b)=80\rightarrow b=6\rightarrow\frac{h}{6}=\frac{h+10}{h}\rightarrow h=15\rightarrow 10+15=25$

25. B $\frac{X_1^{\,2}-X_2^{\,2}}{X_1-X_2}=2023\rightarrow X_1+X_2=2023\rightarrow(2022,1)...(1012,1011)\rightarrow 1011$

26. D $y=x^3\rightarrow\log_8 x+\log_8 y=(\log_8 x)(\log_8 y)\rightarrow 4\log_8 x=(\log_8 x)(3\log_8 x)$

$4=(3\log_8 x)\rightarrow x=(8)^{\frac{4}{3}}=16\rightarrow y=\left(2^4\right)^3\rightarrow L=12$

27. A $\frac{k^6-27}{k^2-3}-27=0\rightarrow\frac{\left(k^2-3\right)\left(k^4+3k^2+9\right)}{k^2-3}-27=0$

$\left(k^4+3k^2+9\right)=27\rightarrow k^4+3k^2-18=0\rightarrow\left(k^2+6\right)\left(k^2-3\right)$

28. C As x goes to infinite the fraction goes to 0. As x gores to negative infinity the fraction goes to 2.5. The answer is 2.5-0=2.5

29. E $\frac{(x+3)+\frac{1}{x+3}-2}{(x-3)(x+2)} \geq 0 \rightarrow \frac{(x+3)^2-2(x+3)+1}{(x+3)(x-3)(x+2)} \geq 0 \rightarrow \frac{(x+3-1)^2}{(x+3)(x-3)(x+2)} \geq 0$ no $\frac{(x+2)^2}{(x-3)(x+2)(x+3)} \geq 0$ negative integers work

30. C C is a negative number raised to an irrational power. That is not defined