1. B
2. D
3. C
4. C
5. D
6. B
7. C
8. B
9. C
10. A
11. E
12. B
13. C
14. E
15. A
16. D
17. B
18. D
19. D
20. A
21. E
22. A
23. D
24. THROWN OUT
25. E
26. A
27. B
28. D
29. D
30. D
1. Combining the two equations using \( \sin^2 t + \cos^2 t = 1 \) we get \( x + \frac{y^2}{5} = 1 \), which is the equation of a PARABOLA, B.

2. \( \cos \theta = \frac{2}{3} \) and \( \sin \theta = \frac{\sqrt{5}}{3} \), so \( \cos 2\theta = \frac{-1}{9} \) and \( \sin 2\theta = \frac{4\sqrt{5}}{9} \), so doubling again and adding one more
\( \cos \theta = \frac{2}{3} \), we get \( \cos 5\theta = -\frac{118}{243} \)

3. Rearranging to \( f(x) = \frac{\sin(11.5x + 4.5x) + \sin(11.5x - 4.5x)}{\cos(11.5x + 4.5x) + \cos(11.5x - 4.5x)} = \frac{2\sin 11.5x \cos 4.5x}{2\cos 11.5x \cos 4.5x} = \tan 11.5x \) Period= \( \frac{2\pi}{23} \)

4. The expression is just \( \sin(x) \), so therefore it passes through quadrants I, III, and IV, so 3 or C.

5. Watch your signs! Solving we get \( \sin x \cos x = -\frac{1}{4} \) so \( \sin x + \cos x \left( \frac{2}{3} + \frac{1}{4} \right) = \frac{1}{2} \) and taking the square root (the positive one) we get \( \sqrt{\frac{1}{2}} = \frac{\sqrt{2}}{2} \) or D.

6. The expression is just \( \lim_{x \to \pi}(\sin 3x) = 0 \) or B.

7. We find \( \cos \theta = \frac{x \sqrt{x^4 - 2x^2}}{1 - x^2} \), so \( \sin \frac{\theta}{2} = \sqrt{\frac{1 - x \sqrt{x^4 - 2x^2}}{2}}, \) flipping that and rearranging we get
\( \sqrt{\frac{2 - 2x^3}{1 - x \sqrt{x^4 - 2x - x^3}}} \) or C.

8. For every odd value the term will be -1, and for every even value it will be 1, so
\( (-1) + 1 + (-1) + 1 + (-1) = -1 \) or B.

9. Expanding \( (\cos x + i \sin x)^3 \) and then combining all of the imaginary terms we get
\( -4i \sin^3 x + 3i \sin x = i \sin 3x \), factoring out an \( i \), we get \( a=-4 \) and \( b=3 \), so the answer is
\( 567(-4) + 3(384) = -1116 \) or C.

10. Coterminal angles terminate in the same place in standard position so A.

11. The range of \( \text{Arc csc} x \) is the domain of \( \csc x \), which is the same as the domain of \( \sin x \) minus 0, so
\( \left[ -\frac{\pi}{2}, 0 \right) \cup \left( 0, \frac{\pi}{2} \right] \) or E.

12. The conic is already in the form \( r = \frac{ep}{1 + e \cos \theta} \), where \( e \) is the eccentricity. So \( e = \frac{1}{2} \) or B or you could do it the long way and find both radii and solve using \( e = \frac{c}{a} \)

13. The smallest angle is determined by \( \cot 2\theta = \frac{A - C}{B} = \frac{2 - 1}{\sqrt{3}} \), so \( \theta = 30^\circ \) or C.
14. So the expression can be simplified down to simply tanx which has a range of all reals, but the original expression has sinx in the denominator, so therefore the quantities are undefined when sinx=0, which is also when tanx=0, so therefore the range is all reals except for 0. Or E

15. The expression simplifies to \( \cos^2 18 = 1 - \sin^2 18 = 1 - \left( \frac{\sqrt{5} - 1}{4} \right)^2 = \frac{5 + \sqrt{5}}{8} \) or A

16. The Coordinates are \( \left( \sqrt{6} - \sqrt{2}, \sqrt{6} + \sqrt{2} \right) \) which correspond to \( (4\cos75, 4\sin75) \) So the angle in radians is \( \frac{5\pi}{12} \) and the length is 4, so D

17. The values of the sequence will simply alternate between 1s and 0s, so the sum is 0, or B

18. Rearranging and using an identity we get \( \cos x (1 + 2\sin x) = 0 \), so we get \( \cos x = 0 \) and \( \sin x = -\frac{1}{2} \), solutions for the two equations add up to \( 5\pi \) or D

19. So we have the angle between two vectors defined as \( \cos A = \frac{a\Phi}{\|a\|\|\Phi\|} = \frac{1}{\sqrt{26}} \), from this we determine the sign to be \( \frac{5}{\sqrt{26}} \) or D

20. Using \( \cos 75^\circ = \cos(45^\circ + 30^\circ) \), we get A

21. \( \tan \left( \frac{\theta}{2} \right) = \frac{\sin \theta}{1 + \cos \theta} \), so since \( \sin \theta = \frac{\sqrt{5}}{3} \), we get \( \frac{\sqrt{5}}{3} \cdot \frac{\sqrt{5}}{1 + \left( \frac{2}{3} \right)} = \left( \frac{\sqrt{5}}{3} \right) \left( \frac{3}{1} \right) = \sqrt{5} \) or E

22. Using law of cosines we have sides of 7 and 5 and cosine of \( \pm \frac{2\sqrt{6}}{5} \) since the sine is ambiguous so doing out the law of cosines we get the two sides as \( \sqrt{49 + 25 \pm 28\sqrt{6}} \), which results in a difference of squares with \( \sqrt{772} = 2\sqrt{193} \) or A

23. Divide everything by 10 and set \( \frac{x}{2} = a \), then we have \( \cos a = \sin 2a \), solving for that we get \( \cos a (1 - 2\sin a) = 0 \), solving we get the sum of the solutions on the interval for a is \( 3\pi \), but we have to multiply by 2 since \( 2a=x \), and then multiply again by 10 to get \( 60\pi \) or D

24. \( 2\sec x + 2\sec x \Phi = a \), then we can rearrange it to say \( \sqrt{\sec x + a} = \frac{a}{2} \), so \( \sec x = \frac{a^2}{4} - a \) so \( \frac{a^2}{4} - a - \sec x = 0 \), plugging into quadratic formula we get \( \frac{1 \pm \sqrt{1 + \sec x}}{2} = 2 + 2\sqrt{1 + \sec x} \), so the sum is 5 or C
25. Using cis once again we get \((\cos x + i \sin x)^{2006}\) = \(\cos 2006x + i \sin 2006x\) this statement will hold true whenever \(\sin x = 0\), since the imaginary portions of the two sides will cancel. Thus solutions are at intervals of \(\pi\), so on the interval it has 7 solutions so E.

26. The expression can be rewritten as \((\sqrt{3})^{9}cis\left(\frac{\pi}{6}\right)\) = \(-81i\sqrt{3}\) or A.

27. The 5th degree taylor polynomial is \(\frac{x}{1!} - \frac{x^3}{3!} + \frac{x^5}{5!}\), so when plugging in 3 we get \(\frac{3}{1!} - \frac{3^3}{3!} + \frac{3^5}{5!} = \frac{21}{40}\) or B.

28. Approaching from the left, the function is undefined, so the Limit does not exist, D.

29. By distributing and then multiplying by the conjugate of the bottom we get D.

30. Cos is an even function, while Csc is odd, so it is symmetrical about origin, D.