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 $\cos 5\theta = -\frac{118}{243}$ **D**
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= $\frac{2\pi}{23}$ **C**
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 $(\sin x + \cos x)^2 = 1 + 2\left(-\frac{1}{4}\right) = \frac{1}{2}$ 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 $\cos\theta = \frac{x\sqrt{x^4 - 2x}}{1 - x^3}$, so $\sin\frac{\theta}{2} = \sqrt{\frac{1 - \frac{x\sqrt{x^4 - 2x}}{1 - x^3}}{2}}$, 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 $Arc\csc x$ 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 quanities 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 (4cos75, 4sin75) 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 5π or **D**

19. So we have the angle between two vectors defined as $\cos A = \frac{a \cdot b}{\|a\|\|b\|} = \frac{1}{\sqrt{26}}$, 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 $\frac{\frac{\sqrt{5}}{3}}{1+\left(-\frac{2}{3}\right)} = \left(\frac{\sqrt{5}}{3}\right)\left(\frac{3}{1}\right) = \sqrt{5}$ 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 3π, but we have to multiply by 2 since 2*a*=*x*, and then multiply again by 10 to get 60π or **D**

24. $2\sqrt{\sec x + 2\sqrt{\sec x \ldots}} = a$, 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 $\frac{1 \pm \sqrt{1+\sec x}}{\frac{1}{2}} = 2 + 2\sqrt{1+\sec x}$, 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 π, so on the interval it has 7 solutions so **E**
26. The expression can be rewritten as $\left(\sqrt{3}\right)^9\left(cis\frac{\pi}{6}\right)^9 = 81\sqrt{3}\left(cis\frac{3\pi}{2}\right) = -81i\sqrt{3}$ 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**