1. D
2. B
3. A
4. B
5. E
6. C
7. B
8. D
9. D
10. B
11. A
12. D
13. C
14. C
15. B
16. B
17. A
18. D
19. A
20. D
21. A
22. D
23. A
24. D
25. D
26. A
27. E
28. C
29. C
30. B
1. D  \(-1126 + 4(360) = -1126 + 1440 = 314\)

2. B  \(1 - none = \frac{31}{32} \rightarrow \frac{1}{32} = \left(\frac{1 \cdot 2 \cdot 5 \cdot x}{8 \cdot 5 \cdot 6}\right) \rightarrow \frac{1}{32} = \frac{x}{24} \rightarrow x = \frac{3}{4} \rightarrow 1 - \frac{3}{4} = \frac{1}{4}\)

3. A  \(x^2 - 1 > 1 \rightarrow x^2 > 2 \rightarrow (-\infty, -\sqrt{2}) \cup (\sqrt{2}, \infty)\)

4. B  \(\cos Y = \frac{5}{\sqrt{26}} \rightarrow \frac{5}{\sqrt{26}} = \frac{104 + 64 - X^2}{4\sqrt{26} \cdot 8} \rightarrow 160 = 168 - X^2\)
   \(X^2 = 8 \rightarrow X = 2\sqrt{2}\)

5. E  Infinite geometry series but absolute value of r is great than 1 so answer

6. C  \(\tan \left(\frac{\pi}{6} + \frac{3\pi}{4}\right) = \frac{\tan \frac{\pi}{6} + \tan \frac{3\pi}{4}}{1 - \tan \frac{\pi}{6} \cdot \tan \frac{3\pi}{4}} = \frac{1}{\sqrt{3} + 1} = \frac{\sqrt{3} - 1}{\sqrt{3} - 1}\)
   \(= \frac{-4 + 2\sqrt{3}}{2} = \sqrt{3} - 2\)

7. B  Graph it and you can see it is a parabola that open left. The vertex is (0,8) with generic form \(4p(x-h) = (y-k)^2\)

8. D  \[
\begin{array}{ccc|ccc|}
Y & N & Total \\
\hline
Y & 5/12 & 2/3 & Y & 2/3 & 0/3 \\
N & 1/3 & 0 & N & 1/3 \\
\hline
Total & 9/12 & 3/12 & 1 & Total & 9/12 & 3/12 & 1
\end{array}
\]
The 2 extremes are listed

9. D  \(D = b^2 - 4ac \geq 0\)
   \(\frac{m^2}{8} - 8n \geq 0 \rightarrow 4n^2 - 4m \geq 0\)
   \(n^2 \geq m \rightarrow n \leq \frac{m^2}{8} \rightarrow m^2 \leq \frac{m^4}{64} \rightarrow \frac{m^4}{64} = m \rightarrow m = 4 \rightarrow n = 2 \rightarrow 4 + 2 = 6\)

10. B  Draw yourself a picture and set RL=x and LU=y and the perpendicular from M to \(x^2 + y^2 = 9\)
   
   \(z^2 + 4 = x^2\)
   
   \(RU=y\)
   
   \(z^2 + 1 = y^2 \rightarrow x^2 - y^2 = 3 \rightarrow 2x^2 = 12 \rightarrow x^2 = 6 \rightarrow x = \sqrt{6}\)
   
   \(y^2 = 3 \rightarrow y = \sqrt{3} \rightarrow A = xy = \sqrt{18} = 3\sqrt{2}\)

11. A  You have 2 scenarios here. n>0 and n<0. If n>0 you have x-intercepts of 4n and 2n and y-intercept of 2n so 8n=24 and n=3. If n<0 then you only have a y-intercept of 4n but since negative you get 4n=-24 so n=-6. Therefore 3-6=-3
12. D \[ \frac{700}{x} = \frac{x+300}{1100+x} \rightarrow x^2 + 300x = 700(1100) + 700x \]
\[ x^2 - 400x - 700(1100) = 0 \rightarrow (x - 1100)(x + 400) \]
\[ x = 1100 \rightarrow 700 + 1100 = 1800 \]

13. C \[ 3x + 2y = 28 \rightarrow 4x - 6y = 12 \rightarrow 9x + 6y = 84 \]
\[ 13x = 96 \rightarrow x = \frac{96}{13} \rightarrow \frac{96}{13} - \frac{52}{13} = \frac{44}{13} \rightarrow 44 + \frac{96}{13} = \frac{140}{13} \]

14. C \[ \frac{n(n+1)(2n+1)}{6} \rightarrow \frac{n}{(n-2)^3} = \frac{1}{3} \]

15. B \[ \cos x \cos y - \sin x \sin y = \frac{4}{5} \cdot \frac{-12}{13} - \frac{3}{5} \cdot \frac{-5}{13} = \frac{-33}{65} \]

16. B \[ 3x - 5y = 19 \rightarrow \frac{-4 - 2}{5 - 3} = -1 \rightarrow m = 1 \rightarrow x - y = 7 \]
\[ (8,1) \rightarrow \sqrt{(8-3)^2 + (1-2)^2} = \sqrt{34} \rightarrow 34 \pi \]

17. A \[ A + B + C + D = -2 \]
\[ 8A + 4B + 2C + D = 6 \]
\[ 27A + 9B + 3C + D = 26 \]
\[ 64A + 16B + 4C + D = 64 \rightarrow n^3 + n - 4 \rightarrow 1 - 0 = -4 = 4 \]

18. D \[ A = P \left( 1 + \frac{R}{N} \right)^{NT} \rightarrow 2 = (1.06)^T \rightarrow \log_{1.06} 2 = T \]

19. A \[ R - M = U - L = D \]
\[ (R - M)(R + M) + (U - L)(U + L) = D(M + R + L + U) \]
\[ D = 3 = U - L \rightarrow L - U = -3 \]

20. D \[ x^2 + 4x + 4 + y^2 - 8y + 16 = 5 + 4 + 16 \]
\[ (x + 2)^2 + (y - 4)^2 = 25 \rightarrow (-2, 4) \rightarrow \sqrt{12^2 + 5^2} = 13 \]
\[ 13 - 5 = R \rightarrow D = 2R = 16 \]

21. A \[ g(x) = \frac{2x^3 - x^2 - 15x + 18}{x^2 - 4} = \frac{(x - 2)(x + 3)(2x - 3)}{(x - 2)(x + 2)} = \frac{(x + 3)(2x - 3)}{(x + 2)} \]
\[ \left( 2, \frac{5}{4} \right) \rightarrow x^2 - 4 \rightarrow 2x^3 - x^2 - 15x + 18 \rightarrow \frac{5}{4} - 1 = \frac{1}{4} \]

22. D \[ 6x^2 - 11x^2 + 4 = 0 \rightarrow \left( 3x^2 - 4 \right) \left( 2x^2 - 1 \right) = 0 \]
\[ \frac{x^2}{3} = \frac{4}{3} \rightarrow \frac{x^3}{2} = \frac{1}{2} \rightarrow \text{two solutions for each for a total of 4} \]

23. A \[ 2^5 \left( 2^4 + 1 \right) = K^5 \left( K^4 + 1 \right) \rightarrow K^5 = 32, -33 \rightarrow 32 - 33 = -1 \]
24. D

1. midpoint \( \left( \frac{3-4}{2}, \frac{5-1}{2} \right) \) slope \( \frac{7}{6} \) \( m = \frac{-6}{7} \) \( 6x + 7y = C \)

\[ C = \frac{17}{2} \rightarrow 12x + 14y = 17 \]

25. D \( \sqrt{14^2 + 18^2 + 21^2} = 31 \) centers are 31 a part. Add each radius to this to get farthest distance 31+30=61

26. A

\[
\begin{bmatrix}
4 & 3 & 2 & 17 \\
-1 & 2 & 3 & 0 \\
0 & 0 & 4 & 2 \\
-2 & 0 & 0 & 0 \\
\end{bmatrix}
\]

\[
\begin{bmatrix}
3 & 2 & 17 \\
-1 & 2 & 3 & 0 \\
0 & 0 & 4 & 2 \\
-2 & 0 & 0 & 0 \\
\end{bmatrix}
\]

\[
2 \left[ 18 + 0 + 136 - (0 + 0 + 8) \right] = 2 \cdot 146 = 292
\]

27. E \( ke + 2e = k - 2 \rightarrow k - ke = 2e + 2 \rightarrow k = \frac{2+2e}{1-e} \) extraneous

28. C \( x + 4 = y^2 - 4y + 4 \rightarrow x + 4 = (y - 2)^2 \rightarrow V = (-4, 2) \) a sideways parabola that has a vertex in Quadrant 2 and opens right. It goes through the origin and therefore covers every quadrant but 3

29. C

30. B This creates a 30,60, 90 degree triangle with a hypotenuse of 10 and a vertical side of 5 across from the 30 degree angle. Thus the bearing is 30 + 60 =90