1) B. Use a system of equations \( a(-1^2) + b(-1) + c = -6, \ a(2^2) + b(2) + c = 9, \ a(3^2) + b(3) + c = 22. \) \( a = 2, \ b = 3, \ c = -5. \ 2 + 3 + (-5) = 0. \ B.

2) B. The lines form a triangular region with base from \((-5,0)\) to \((5,0)\) and peak at \((0,5)\). When rotated it forms a cone with height 5 and radius 5. Volume = \((1/3)(\pi)(5^2)(5) = \frac{125\pi}{3}\), B.

3) D. Work = Force \times Distance = (17)(\sqrt{2^2 + 3^2}) = 85.00, D.

4) C. \( V_{sphere} = \frac{4}{3}(\pi)(r^3) \). Initial radius = 6, Final radius = 12. \( S_{sphere} = 4\pi r^2. \ 4\pi(12^2) - 4\pi(6^2) = 432\pi, C. \)

5) C. Use the distance formula for \((3,8), (3,4)\) to find the radius = 4, center at \((1, -1)\). a = 3, b = 2. Thus \( c^2 = 9 + 4. \ c = \sqrt{13} \). Thus Foci are \((1,-1±\sqrt{13})\), B.

6) B. The description yields points in Quad. I, II. The distance is the hypotenuse of a right triangle and legs of 2, 3.

7) C. 3sin(\(\theta\)) + 1 yields a sine wave of amplitude 3, shifted up one. Thus the min. value = -2, C.

8) B. The description yields three points, (0,0,0), (800,-700,0), (0,0,5280). The angle sought is formed by the vectors from \((0,0,5280)\) to \((0,0,0)\) and \((0,0,5280)\) to \((800,-700,0)\). The vectors in unit form are \(0\hat{i} - 700\hat{j} - 5280\hat{k}\). Thus the angle formed shows \(\cos(\theta) = \frac{P \cdot Q}{\|P\|\|Q\|} = \frac{294}{(7\sqrt{10})(6\sqrt{13})} = \frac{7\sqrt{130}}{130}\). Thus \(\theta = 52.12^\circ \approx 52^\circ, B. \)

9) A. The possible roots are \(±(1,2,3,5,6,10,15,30)\). Synthetic div. shows the roots to be \(-3,1,2,5\). - 3 + 1 = -2, A.

10) A. After the first two marbles are pulled, the marbles remain are 4 R, 2 G, 4 Bu, 3 Bk. Thus, the prob. of the third red or green = \(\frac{4}{13} + \frac{2}{13} = \frac{6}{13}\), A.

11) C. The horizontal asym., \(y = a\), can be determined by end behavior. The equal degrees for the numerator and denominator yield \(a = 1\). The vertical asym. are the roots of the denominator, 2, -1, -3. -1, A.

12) A. The initial height, \(h(0) = 2\). Thus \(2 = 11t - \frac{2}{3}t^2 + 2\). Solving yields, \(t = 0, \frac{33}{2} = 16.5, C. \)

13) C. The linear function can be generated with the slope of \((3,18), (-2,17)\). \(m = \frac{1}{5}\). \(y = \frac{1}{5}x + b\). Use \((3,18)\) to find \(b = 17.4\). \(y = \frac{1}{5}x + 17.4\). \(y = 17.4 @ x = 0, C. \)

14) A. The horizontal asym., \(y = a\), can be determined by end behavior. The equal degrees for the numerator and denominator yield \(a = 1\). The vertical asym. are the roots of the denominator, 2, -1, -3, -1, A.

15) B. The description yields two vectors from \([0,0]\) to \([-21,7]\) and \([-18,-12]\). Thus, \(\cos(\theta) = \frac{P \cdot Q}{\|P\|\|Q\|} = \frac{27878400}{5280(20)(72521)} = \frac{7\sqrt{130}}{130}\). Thus \(\theta = 11.38^\circ, B. \)

16) A. Since the order does not matter, this reduces to \(35C_4 = \frac{35!}{(4!)(31!)} = 52360, A. \)

17) D. Orthogonal vectors have a dot product of zero, thus \((3)(-2) + (2)(1) + (-1)(-m) = 0. \ m = 4, D. \)

18) B. The description yields three points, (0,0,0), (800,-700,0), (0,0,5280). The angle sought is formed by the vectors from \((0,0,5280)\) to \((0,0,0)\) and \((0,0,5280)\) to \((800,-700,0)\). The vectors in unit form are \(0\hat{i} + 0\hat{j} - 5280\hat{k}\) and \(800\hat{i} - 700\hat{j} - 5280\hat{k}\). Thus the angle formed shows \(\cos(\theta) = \frac{P \cdot Q}{\|P\|\|Q\|} = \frac{27878400}{5280(20)(72521)}\). Thus \(\theta = 11.38^\circ, B. \)

19) C. The description “carrying capacity” reduces the problem to the limit of \(P(t)\) as \(t\) approaches infinity. The denominator limits to \(1 - 0, 1. \ Thus 227, C. \)

20) A. Perpendiculars have a zero dot product. \((-6.5)(-8) + (3)(-12) + (8)(-2) = 0, \ Thus perpendicular, A. \)

21) A. Use law of cosines to find \(7^2 = 3^2 + 5^2 - 2(5)3\cos(\alpha). \ \alpha = 120^\circ. \ \tan(120^\circ) = -\sqrt{3}, A. \)

22) C. 92 minutes = \(\frac{23}{15}\) rotations of the hand. 4 inch hand yields a circumference of \(8\pi\). \((8\pi)(\frac{23}{15}) \approx 38.54, C. \)

23) B. The description yields points in Quad. I, II. The distance is the hypotenuse of a right triangle and legs of 2, 3. Law of cosines yields the length of 3.6, B.

24) D. \(f(x) = 2x^2 + 2x - 1. \ f(x+h) = 2(x+h)^2 + 4hx + 2x + 2h^2 + 2h - 1. \ f(x+h)-f(x) = 4hx + 2h^2 + 2h\). Divide by “h” yields \(4x + 2h\). Limit as \(h\) goes to zero yields \(4x + 2, D. \)

25) A. Definition of Parabola, A.

26) C. 3sin(\(\theta\)) + 1 yields a sine wave of amplitude 3, shifted up one. Thus the min. value = -2, C.

27) A. Prob. = \(P(B|R) + P(B|W) + P(B|B)\) = \(\frac{2}{7}(\frac{1}{3}) + \frac{2}{5}(\frac{1}{3}) + \frac{1}{7}(\frac{1}{5})\) = \(\frac{1}{7}\), A.

28) A. Use Pascal’s triangle. \(117^{th}\) term is \(nC_{116}\), so \(150C_{116}, A. \)

29) A. Center at \((1,-1)\). \(a = 3, b = 2. \ Thus c^2 = 9 + 4. \ c = \sqrt{13}. \ Thus Foci are \((1,-1±\sqrt{13})\), A.

30) D. Sub. \(x = y\), so \(x = \frac{9}{5}x^2 - \frac{10}{9}\). Solve to find \(x = \{\frac{10}{9}, \frac{5}{9}\}, D. \)