THETA APPLICATIONS 2004 SOLUTIONS

1. x + y = 52; 3x = …y υ 12x = y; x + 12x = 52υx = 4; (12x)x = 192 D
2. linear function, slope is 28.4; y = 28.4x + 269.4, (x = 0 in 2000); y(4)= 383 B
3. 4s +5(320) µ2500; s µ225 A
4. first 2 equations intersect, first and third has a factor of –3; H = -3 B
5. (f(4)- f(0))/(4-0) = (20-4)/4 = 4 A
6. A = $50*2^{8.5/0.75}$ = 129015.915□129016 B
7. 300 = π (5)*l* ;*l* = 60/π ; h = √ (*l* - 25) = 18.43 C
8. 20x + 30y + 35z = 415; x + y + z = 15; y + 2z = 13 υy = 13 – 2z; 20x + 390 – 60z + 35z = 415; x + 13 – 2z + z = 15 υ20x – 25z = 25; x – z = 2 υ x = 5 C
9. (30 + 2x)(40 + 2x) – 1200 = 296; 4x″ + 140x = 296; 4(x + 37)(x – 2) = 0; x = 2 A
10. upward parabola, vertex at x = –b/2a = 45; increasing (45,80] D
11. (S – C)(x) = 0.85x – 2.48; slope = 0.85 D
12. 3 hr 14 min = 194 min. 194/26.2 = 7.404 min = 7:24 min: sec A
13. x(x + 2)(x + 4) = 315; x≥ + 6x″ + 8x – 315 = 0; (x – 5)(x″ +11x + 63) = 0; x = 5; 5 + 7 + 9 = 21 B
14. $(3.34x10^{53})''$ = 3.34″ x 10^{106} = 11.1556x10^{106} = 1.11556x10^{107} D
15. d = 1.23∗ √ 7 = 3.25 C
16. a determinant of 0 means slope are the same; slope of 3x + 5y = -6 is –3/5 = 1.2/-2 C
17. let y = |x – 5| ; y² – 4y + 3 = (y – 3)(y – 1) = 0, y = 3 , 1; |x – 5| =3,x = 8,2 ; |x – 5| = 1
    x = 6, 4 ; 4 solutions E
18. # of glasses 36 – 3d (day 1 = 36 – 3(1) = 33);# of cookies 2 + 4d (day 1 = 2 + 4(1)=6)
    2 + 4d = 2(36 – 3d); d = 7 D
19. V = (20 – 2x)(24 – 2x)x where x is length of the side of a congruent side. 20 – 2x > 0,
    24 – 2x > 0, x > 0, x must be between 0 and 10, (0,10) A
20. 20800 + 0.02(30500x) µ 45000; 610x µ 24200; x µ 39.6ι 40 B
21. (1/10)t + (1/8)t – (1/16)t = 1 - .40; t is hours; 8t + 10t – 5t = 48; t = 48/13 D
21. 1 = -5t² + 30t + 1; 0 = -5t(t – 6) ; t = 0 or 6; since the ball is caught after the initial
    value t = 6 C
23. 0.35(92) + 0.65F µ 90; 0.65F µ 57.8; F µ 88.923 C
23. x = court hrs, y = office hrs; x + y < 60; x [25; y µ 20, y µ 2x; objective function is
    D = 275x + 125y.Vertices (0,60), (20,40), (0,20), (10,20); D is greatest with (20,40)
    D = 275(20) + 125(40) = 10500 B
25. (13!)/(2!∃ 3!∃ 2!) = 13!/ 24 = 13!/ 4! = $_{13}P_9$ D
26. n =1 year;T = (24000-24000$(1.05)^n$)/(1-1.05) =1,000,000 geometric sum;
    -74000 = -24000$(1.05)^n$; n = ln(74/24)/ln(1.05) = 23.078 This is just after the end of
    the 23rd year so the answer is 24th A
26. vertex (0,0), top of towers (!2640,660); y = 4px″; 660 = 4p(2640″); p = 1/42240;
    y = (1/10560)x″; at x = 2340, y = 518.523 ⊄519 ft C
28. 100/(1 - —) = 400 D
29. a = 600, c = 480, 600″ = b″ + 480″ ; b = 360 ; 2b = 720 E
29. Add the equations together and 5x″ = 5, x = ! 1; substitute x = 1 into $2x^2 - 2xy + y^2 = 2$ you get the points (1,0), and (1,2), and substitute x = -1 you get (-1,0), (-1,-2); greatest distance occurs between (1,2) and (-1,-2) is √ (4 + 16) = 2√ 5 C