Honors Algebra 2
Final Exam 2002 – Answer Key

PART A: Multiple Choice Problems

1. a	4. e	7. b	10. a	13. d
2. b	5. b	8. a	11. c	14. c
3. d	6. b	9. b	12. d	15. b

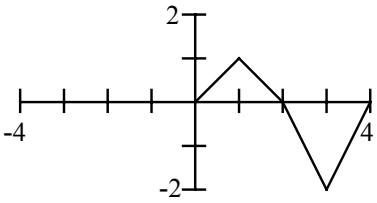
PART B: Open Response Problems (5 points each)

16. a. $y \geq 1$

b. inverse is $f^{-1}(x) = \pm\sqrt{x-1}$, a "sideways" parabola, which does not pass the vertical line test

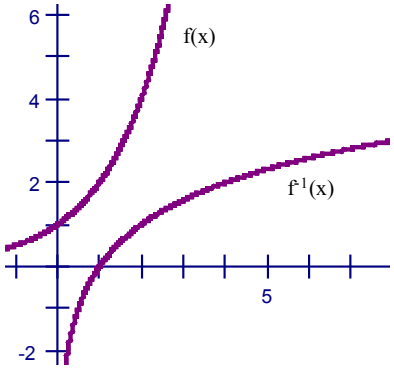
c. $f(g(1)) = f(-2) = (-2)^2 + 1 = 5$

d. g(x-2)



17. a. $f^{-1}(x) = \log_2(x) = \dfrac{\log_{10}(x)}{\log_{10}(2)}$

b. $f(x)$ and $f^{-1}(x)$



18. Using the second equation, s = 21 – 4r so the other two equations become

2r + 3(21 – 4r) – 5t = 23 => -10r – 5t = -40 => 2r + t = 8
r – 5(21 – 4r) – t = 2 => r – 105 + 20r – t = 2 => 21r – 107 = t

From these two equations we know 8 – 2r = 21r – 107 so r = 5.
Plug back in to find that 21(5) – 107 = t = -2 and 21 – r(5) = s = 1
so the solution is (r, s, t) = (5, 1, -2)

Alternatively, put the coefficients in an augmented matrix $\begin{bmatrix} 2 & 3 & -5 & 23 \\ 4 & 1 & 0 & 21 \\ 1 & -5 & -1 & 2 \end{bmatrix}$ and use rref on the calculator to get $\begin{bmatrix} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & -2 \end{bmatrix}$

19. $f(x) = (x-1)(x+3i)(x-3i)$

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PART C: Free Response Problems (10 points each)

20. a. $g(x) = 2(x^2 + 6x) + 13 = 2(x^2 + 6x + 9) + 13 - 2(9) = 2(x+3)^2 - 5$

b. vertex (-3, -5); axis of symmetry x = -3

c. $y = \frac{1}{4p}(x-h)^2 + k = 2(x+3)^2 + -5$

focus = (-3, -5 + p) = (-3, $-4\frac{7}{8}$)

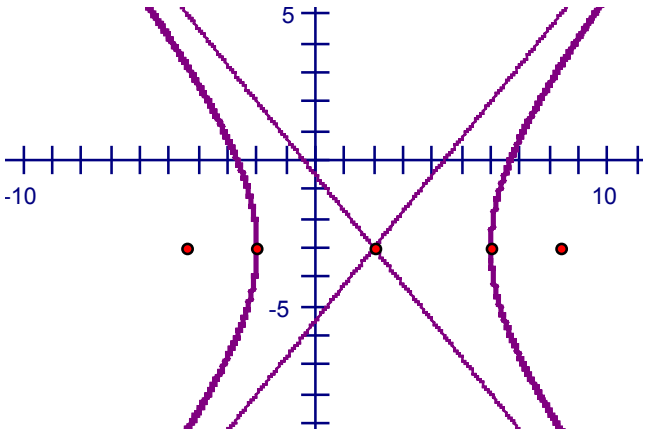
21. a. $r_x \neq r_y$, both terms have different sign so conic = hyperbola

b. $r_x = 4,\ r_y = 5,$ center = (2, -3)

vertices: (-2, -3); (6, -3)

asymptotes: $y + 3 = \pm\frac{5}{4}(x-2)$

foci: $(2 \pm \sqrt{41}, -3) \approx (-4.4, -3)$ and $(8.4, -3)$



22. a. ${}_2C_1(.55)^1(.45)^1 = .495$

b.

${}_nC_0(.55)^0(.45)^n \leq .01 \rightarrow n \geq \frac{\log(.01)}{\log(.45)} \quad \therefore\ n = 6$

(Note: log(.45) < 0)

c. P(X) = 0.55, P(Y) = 0.45, P(Z) = 0.55
P(X and Y) = 0, P(X and Z) = 0.3025, P(Y and Z) = 0.2475
Z is independent of both X and Y, the first flip does not affect the second flip

d. X and Y are mutually exclusive because you can't flip head and tails at the same time.