Graph:

1. Solve $x^2 - 2x - 35 = 0$ in 3 ways by...
      a. ... completing the square
      b. ... quadratic formula
      c. ... factoring

2. Discuss a situation in which each of the three skills might be advantageous or even essential ("because my teacher requires it" is not a legit response).

3. Solve the inequality $(x-1)^2(x+2)^3(2x-3) \geq 0$

4. Give a quick graph (including any intercepts) of $f(x) = (x-1)^2(x+2)^3(2x-3)$?

5. What is the domain of $f(x) = (x-1)^2(x+2)^3(2x-3)$?

6. What is the domain of $f(x) = \sqrt{(x-1)^2(x+2)^3(2x-3)}$?

7. What is the domain of $f(x) = \sqrt{\dfrac{(x-1)^2(2x-3)}{(x+2)^3}}$?

8. Sketch the graph of $f(x) = \dfrac{(x-1)^2(2x-3)}{(x+2)^3}$. Show any and all intercepts and asymptotes.

9. Sketch the graph of $f(x) = \dfrac{(2x+10)(x-1)^2(2x-3)}{(x+2)^3(x+5)}$. Show all intercepts, asymptotes, and/or holes.

10. What is the domain of $f(x) = \log_3\left((x-1)^2(x+2)^3(2x-3)\right)$?

11. What is the domain of $f(x) = \log_7\left(\dfrac{(x-1)^2(2x-3)}{(x+2)^3}\right)$?

12. Let $f(x) = \dfrac{x-2}{x+1}$ and $g(x) = \sqrt{x+2}$.
      a. Find $(f \circ g)(x)$. What is its domain?
      b. Find $(g \circ f)(x)$. What is its domain?

13. What is $\sqrt{x^2}$?

14. (5 pts) Determine which of the following are one-to-one *functions*. Indicate by writing "Yes" or "No" below the graphs. Tell me which one isn't a function.
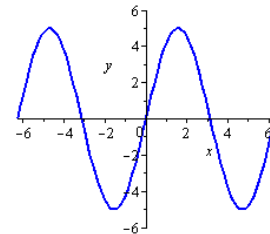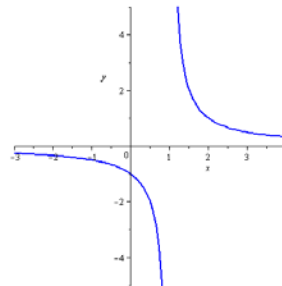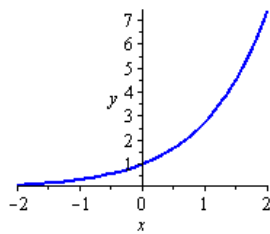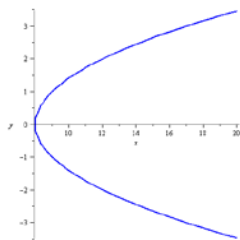
15. Let $f(x) = 2^{x-1} - 4$. Find $f^{-1}(x)$.

16. Use Descarte's Rule of Signs and the Rational Zeros Theorem to find all the real zeros of $f(x) = 2x^4 + x^3 - 9x^2 + 16x - 6$.

17. Use the *real* zeros to factor f over the real numbers. This is *likely* to involve an irreducible quadratic factor.

18. $f(x) = \begin{cases} x + 3 & if -2 \le x < 1 \\ 5 & if\ x = 1 \\ -x + 2 & if\ x > 1 \end{cases}$

19. Find the sums:

a. (5 pts) $\displaystyle\sum_{n=1}^{20} (1.02)^{n-1}$

b. (5 pts) $\displaystyle\sum_{n=1}^{\infty} 3\left(\frac{1}{2}\right)^{n-1}$

20. Use the Binomial Theorem to expand $(3x - y)^6$.

21. Suppose each of the 4 people on the committee in part a will be given a particular job (Chairman, Treasurer, Secretary, Sergeant-at-Arms, for instance). How many possible committees are possible, if different job assignments counts as a different committee (even if the same 4 people are *on* the committee)? In other words, how many ways are there to *choose and arrange* 4 people from a group of 60?

22. Solve the system of equations, if possible. Express your answer as a solution set. If there is more than one solution, give the general solution and a particular solution. If you conclude there is no solution, you must show your reasoning and it must be convincing. Show the row operations you employ (for instance, -R1 + R3) and each matrix step.

$$2x + y + 3z = 7$$
$$x + y + z = 2$$
$$2x + 3y + z = 1$$

23. The half-life of carbon-14 is (approximately) 5800 years. (I think it's 5600 years in the textbook, but let's roll with 5800.) Using this half-life, we obtain an exponential decay function

$$A(t) = A_0 e^{-kt} = A_0 e^{-\frac{\ln 2}{5800} t} \approx A_0 e^{-0.00011950813t}.$$

How old is a sample from a neolithic fire pit if it is found that 18% of naturally-occurring carbon-14 is present in the sample? For ease of solving this problem, you may want to just use a symbolic k until the last step. Round your final answer to the nearest year.

24. The half-life of Millsium is 39. Construct an exponential decay model for this radioactive isotope.