Read all directions carefully and show all your work for full credit.

Good Luck!!!

\[
u^3 - v^3 = (u - v)(u^2 + uv + v^2)
\]

\[
u^3 + v^3 = (u + v)(u^2 - uv + v^2)
\]
1. Multiply out the following expression and simplify.

\[(x - 4)(2x + 1)(3x - 5)\]

2. Give the equation of the line passing through the point \((2, 3)\) that is parallel to \(2x - 3y = 1\).
3. Find all solutions to the equation

\[ \sqrt[4]{2x^2 - 8} - \sqrt[5]{5x + 4} = 0 \]

4. If \( F(x) = x^3 - \sqrt{x} + \frac{4}{x} \) then find \( F(3) \) and \( F(5t - 7) \) but do not simplify either one.
5. Find all the solutions to

\[ 6x^2 - 2x + 3 = x^2 - 5x + 10 \]

6. Given the points (2, 3) and (−2, 4) find the distance between them and the midpoint on the line segment connecting them.
7. Perform the division (Hint: Can’t use synthetic)

\[
\frac{x^4 - 7x^3 + 15x^2 - 19x + 6}{x^2 - 5x + 2}
\]

8. Find the slope of the line that passes through (2, 1) and (−2, 5). Then write down the equation of the line that passes through the points in General form and Slope-intercept form.
9. Find all the solutions to

\[ 1 = \frac{4}{x + 3} + \frac{7}{x^2 + 8x + 15} \]

10. Find all solutions to

\[ |5x - 7| = x + 3 \]
11. Using the rules of exponents simplify the following expression

\[
\frac{(7x^4 y^{-2} z^4)^3}{(3x^{-1} y^3 z^6)^4}
\]

12. Graph on the real number line all the solutions to

\[
|4x - 7| \leq 5
\]
13. Find the domain of the function

\[ T(x) = \frac{\sqrt[3]{3x - 6} - \frac{10\sqrt{x + 5}}{x^3 - 4x}}{x^3 - 4x} \]

14. Solve the following system of equations any way that you would like.

\[
\begin{align*}
4x - 3y &= 13 \\
5x + 6y &= 26
\end{align*}
\]
15. Factor completely $4x^8 - 36x^6 + 4x^5 - 36x^3$

16. Graph all solutions to $4x + 2y > 10$ in the rectangular coordinate system.
17. Find all real and complex solutions to $6x^3 + 4x^2 + 3x + 5 = 0$ when $x+1$ is one of the factors.

18. Sketch the graph of all the solutions to $4x - 7 \geq 2x + 7$ on the real number line.
19. Using your knowledge of shifts and reflections of graphs to graph the following

\[ G(x) = -|x - 3| + 5 \]

20. Find the slope, y-intercept, x-intercept, and graph the following line

\[ 7x + 3y = -42 \]
Bonus: Solve the following system of equations. (Hint: solve the last two equations first then substitute the answers back into the first one.)

\[
\begin{align*}
3x + 6y - 2z &= 37 \\
-4x + 5y &= 21 \\
2x + 3y &= 17
\end{align*}
\]