This practice exam is a modified copy of a rough draft of the real exam. Do not expect the real exam to be exactly like this. It is likely that there will be fewer problems but that a few problems may become harder. It is also possible that I may decide that a particular type of problem is too difficult or not as important as something else so it may be dropped from the exam. Solutions to this practice exam will be available after the class on Wednesday. The review for the test will be on Wednesday as well. Since this is so similar to the real thing let me know if something is unclear.

Read all of the following information before starting the real exam:

- Show all work, clearly and in order, if you want to get full credit. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- This exam is closed book and no calculators are allowed.
- Justify your answers algebraically whenever possible to ensure full credit. You may also use pictures whenever appropriate. Remember that you are trying to communicate to me that you understand the material. I am not a mind reader.
- Circle or otherwise indicate your final answers.
- Please keep your written answers brief; be clear and to the point. I will take points off for rambling and for incorrect or irrelevant statements.
- This test has 12 problems and is worth 100 points, plus some extra credit at the end. It is your responsibility to make sure that you have all of the pages!
- Good luck!
1. (10 points) Your friend goes to the auto parts store to get a distributor cap and rotor. She tells you that together they were $30 and the rotor is $5 less than half the price of the cap. Instead of asking your friend how much the each item was, you decide to figure it out yourself, so you look cool.

   a. (5 pts) Set up a system of linear equations that describe this situation. (don't solve them)

   b. (5 pts) Solve the system of linear equations using your method of choice.
2. (14 points) Rewrite the following expressions using just one rational exponent or if possible write it as an integer.
   a. (4 pts) \(8^{\frac{3}{4}}\)

   b. (4 pts) \((3^2)^{\frac{5}{2}}\)

   c. (3 pts) \((z^{\frac{6}{\pi}})^{\frac{5}{4}}\)

   d. (3 pts) \(\frac{\sqrt[4]{u^7}}{u^3}\)

3. (4 points) Write 2,030,400,000,000 in scientific notation.

4. (8 points) Let the polynomial \(p\) be defined by
   \(p(x) = (x - 4)(2x + 3)\)
   a. (4 pts) Write \(p\) in standard form \((p(x) = ax^2 + bx + c)\).

   b. (4 pts) What is \(p(4)\)?
5. (10 points) On video games it is not uncommon for characters to jump their own height and more. For a 6 foot tall human how fast would they have to leave the ground to jump 9 feet (150% of their height) into the air. Remember that

\[
\begin{align*}
   h(t) &= h_0 + v_0 t - 16t^2 \\
   v(t) &= v_0 - 32t
\end{align*}
\]

(Be sure to study the homework problem 28-31 from assignment 6).
6. \((10 \text{ points})\) Simplify 
\[
\frac{1}{x - 3} - \frac{7}{x^2 + x - 12}
\]

7. \((10 \text{ points})\) Simplify 
\[
\frac{1}{x^2 + x - 12} \times \frac{1}{x + 4}
\]
8. \((10\text{ points})\) A circular swimming pool has a depth \(d\) and a radius that is 10 times its depth. A square pool has the same depth as the circular pool its width 2 less than 10 times its depth. What is the ratio of the square pool’s volume to the circular pool’s volume?

9. \((10\text{ points})\) Solve the following system of equations

\[
\begin{cases}
x + z = -1 \\
-x - y - 2z = -2 \\
x + y = 2
\end{cases}
\]
10. (10 points) You have just landed on a small planet where gravity is \( \frac{1}{16} \) what it is on earth. Because of this the projectile motion equations become.

\[
\begin{align*}
  h(t) &= h_0 + v_0 t - \frac{1}{2} t^2 \\
  v(t) &= v_0 - 2t
\end{align*}
\]

To celebrate your landing you throw a rock straight up it the air with an initial velocity of 30 \( ft/sec \). How high does the rock go?
11. (4 points) Solve the following equation.

\[ \sqrt{3x - 4} = 7 \]

12. (4 points) Factor \( p(x) = x^2 + x - 20 \)
**Bonus Question** (2pt)
Add every number from 1 to 100 together. (For example here is the sum of all the numbers from 1 to 5. $1+2+3+4+5=15$)

The bonus questions on the tests are almost never worth the time it takes to solve them. Only attempt them if you are confident in the rest of the test. Also, there is always a trick that makes the calculations simple.