Math_139/Burger

(Some) Final Exam Study Problems

1. (a) Factor each of the following polynomials into linear terms with integer coefficients:

$$h(x) = x^4 + x^3 - 6x^2 - 4x + 8$$

$$g(x) = 2x^3 - 6x^2 + 8$$

(b) Sketch a graph of $\frac{h(x)}{g(x)}$, including as much qualitative information as possible.

2. Applications of systems of linear inequalities:

Problem 1

Jason is buying wings and hot dogs for a party. One package of wings costs $7. Hot dogs cost $4 per pound. He must spend less than $40.

•Write an inequality to represent the cost of Jason's food for the party.

•Jason knows that he will be buying at least 5 pounds of hot dogs. Write an inequality to represent this situation.

•Graph both inequalities and shade the intersection.

•Identify two solutions and justify your answers.

Problem 2

The boys and girls soccer clubs are trying to raise money for new uniforms. The boys' soccer club is selling candy bars for $2 a piece and the girls' soccer club is selling candles for $4. They must raise more than $800.

•Write an inequality to express the income from the two fundraisers.

•The girls expect to sell at least 100 candles. Write an inequality to represent this situation.

•Graph both inequalities on a grid and shade the intersection.

•Give two possible solutions to this system. Justify your answer.

See solutions at : http://www.algebra-class.com/systems-of-inequalities-practice.html

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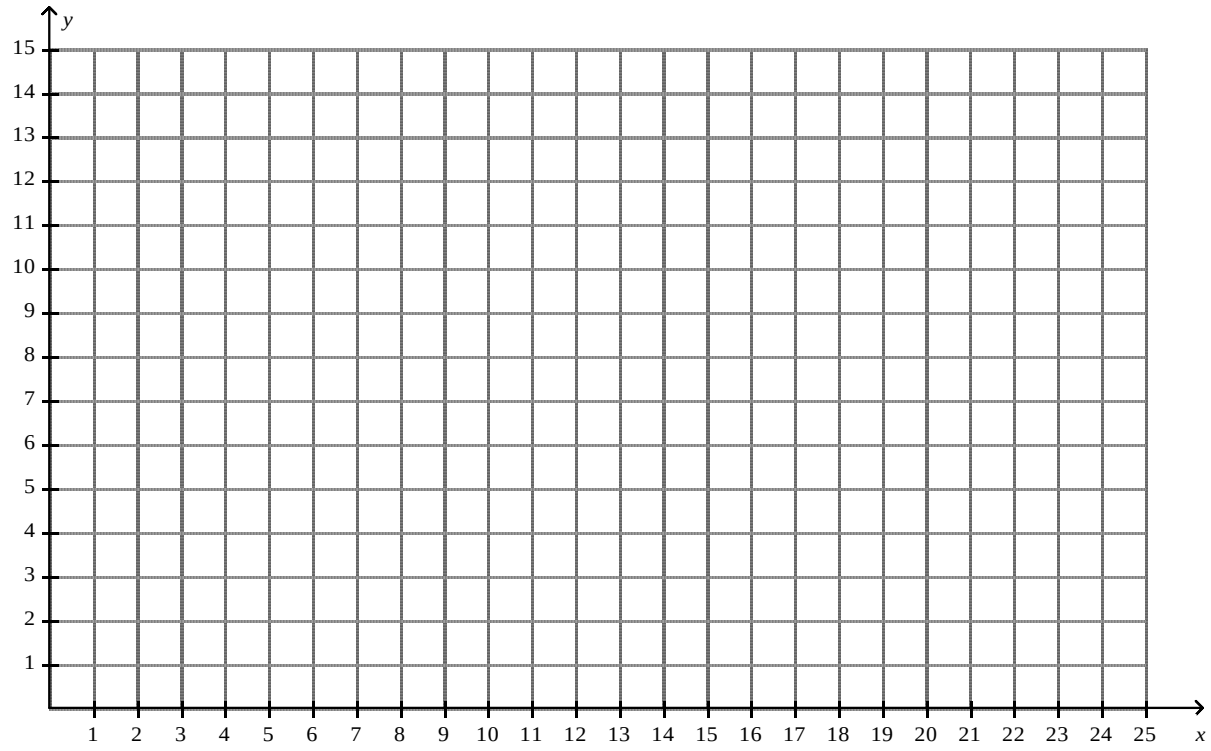

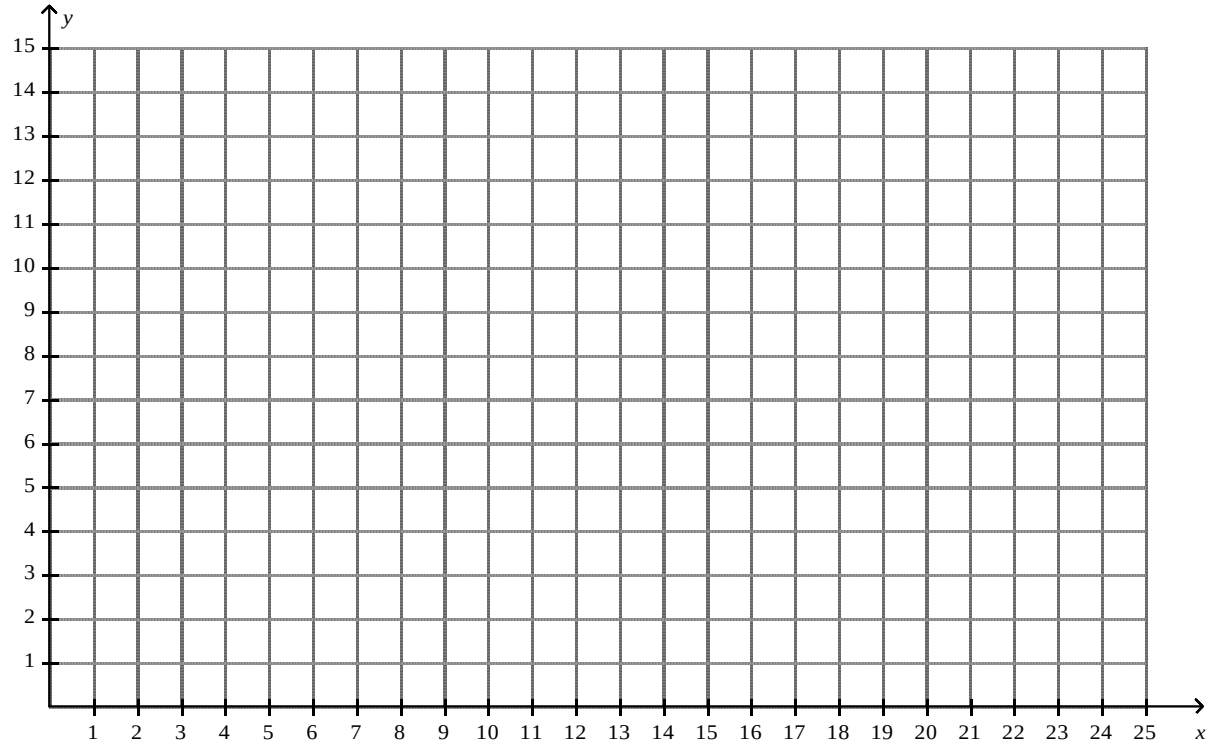

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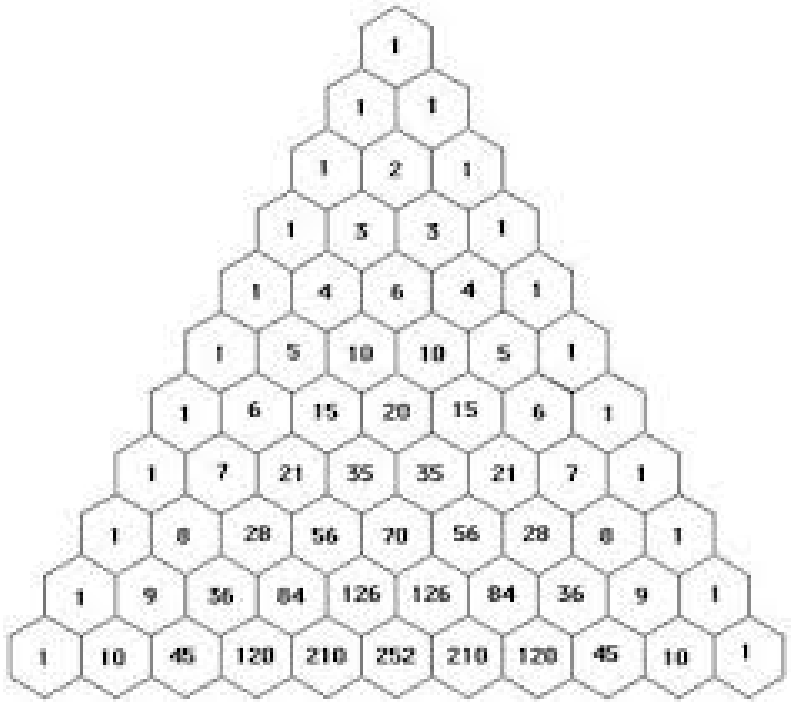
3. Using <u>your own</u> derivation of Pascal's triangle, determine the following for the binomial expansion of:



$$\left(-x^5 + \frac{2}{x^3}\right)^{16}$$

a. The middle term.

b. The 4th term.

c. The coefficient of the term with no x.

4. Find a polynomial with integer coefficients that has $1 - \sqrt[4]{3}$ and i as roots, with a leading coefficient of 3.

5. Find real and imaginary parts to the complex solutions of the equation:

$$x^3 - x^2 - 7x + 15$$

6. Solve the equation: $2(5^{3x-4}) + 1 = 251$, rounding the answer to two decimal places.

Logarithms – know how to simplify log expressions using properties!

Like in this previous problem.

7. Given $ln6 = 1.79$ and $ln2 = 0.69$, then find:
   a. $ln3$
   b. $ln12$
   c. $ln72$

   NOT using a calculator but demonstrating knowledge of the properties of logarithms using only the above given decimal numbers.

8. A math induction proof of some kind of the types discussed in class.

9. A matrix inverse and decoding problem (like M3). *(probably* 3×3 *matrices only for the inverse)*

10. A linear combination vector problem (this was not on the last midterm!) Find a linear combination of the vectors $\langle 1,1,1\rangle$, $\langle 1,-1,1\rangle$ *and* $\langle 2,1,-1\rangle$ that can make the vector $\langle 5,7,-1\rangle$ *if possible!*

11. Questions about groups, rings and fields. (read and re-read chapter 10.)

You must know the definitions. Do you know what additive and multiplicative inverses are? Do you know what the associative property is? Do you know how to prove closure of operations?

Do you understand how to basically show that:
$\mathbb{Q}[\sqrt{5}] = \{a + b\sqrt{5}: a, b \in \mathbb{Q}\}$ is a field? Could you prove the multiplication or addition is closed? Associative? What are the additive and multiplicative identities? What are examples of additive or multiplicative inverses in this field?

You should be able to define, in writing, what a group, ring or field is. I would know this if I were you!