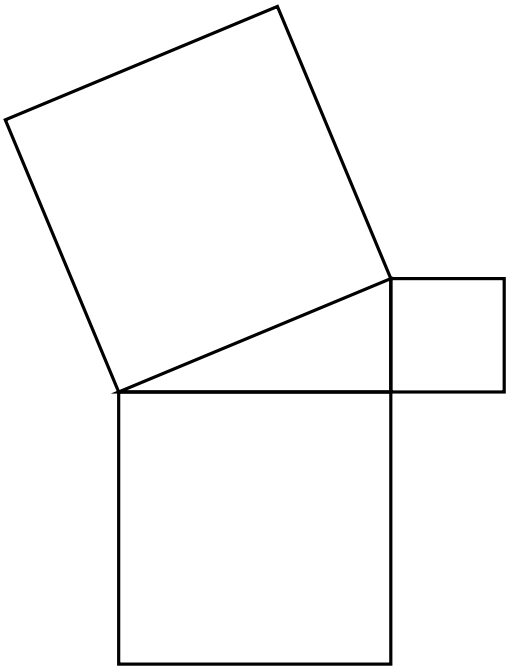
Math 111 - Midterm 1 Review Problems

Here are some review problems for the first midterm. I may add more review problems before the exam, so you might want to check this page again later. Two thirds of the exam will be based on problems just like these. The rest will be similar to the problems in the workshops and homework.

1. This pictures depicts (but does not prove!) a famous theorem from geometry. What theorem is it, and what does it say about the three squares in this picture?



2. Describe in words how to tell if a number is divisible by 300.
3. How many prime numbers are there?
4. What is the difference between a rational and an irrational number.
5. How can you tell that the number $6.\overline{7} = 6.7777...$ is rational?
6. It is a fact that $17 \times 24 = 408$. Use this information to help find 413 mod 24 without a calculator.
7. If a 1/2 scale model of a tank holds 10 gallons, how many gallons does the full sized tank hold?
8. A giant who is twice as tall as a 200 lbs. man, but otherwise proportional would weigh how much?
9. The radius of the sun is 100 times the radius of the Earth. How much bigger is the surface area of the sun?

10. The triangle on the left contains about 140 dots. The triangle on the right is scaled by a factor of 3. Estimate the number of dots in the larger triangle.

11. What are the first 3 positive numbers that are equivalent to -13 modulo 11?
12. Is 67122 divisible by 33? How can you tell without a using a calculator or long division?
13. Explain why calculating mod 10's is so easy.
14. Compute the following moduli (without a calculator)
    (a) 3564 mod 3
    (b) 365723 mod 11
    (c) 455417 mod 9
15. If it is 10 AM now, then what time will it be 17 hours from now? What about 37 hours from now?
16. If today is Monday, then what day of the week will it be 100 days from now? What day of the week would it be 777 days from now?
17. If I tell you that 216 days from now will be a Friday, then what day is it today?
18. What are the first 10 prime numbers?
19. Find the following moduli (without a calculator):
    (a) 13 mod 5
    (b) 7 mod 2
    (c) 42 mod 3
20. Why do bar codes have a check digit? What does the check digit do?
21. Find the following without a calculator, and write your answer in scientific notation.
    (a) $2,000 * (4.0 \times 10^6)$
    (b) $\dfrac{6.0 \times 10^{13}}{2.0 \times 10^5}$

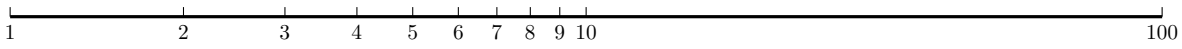
(c) $(3 \times 10^5)^3$

(d) 5 billion squared

(e) 100^6

(f) 4 million divided by 0.01.

22. Indicate where the numbers 25, 48, and 70/3 belong on the logarithmic scale below.



23. Convert the following growth factors into percentage changes. Be sure to indicate if it is a percentage increase or decrease.

(a) Quadruple

(b) 1.3

(c) 0.4

(d) 2.7

24. Suppose that you put \$1200 in a savings account that pays 2% APR compounded monthly. Write down a formula for how much money you will have in that account after 10 years. You do not need to simplify your answer.

25. Suppose that my investment portfolio grows 10% one year, and then declines 10% the next year. Calculate the total percentage change in my investments (without a calculator).