

Math 101 Practice Final Exam #2

- Determine the third entry of the progression with first entry 12 and second entry 9 if the progression is...
 - an arithmetic progression.
 - a geometric progression.
- Determine the last digit of the number 9^{12345} ?
- If a meal consisting of steak, salad and potatoes costs \$30 where the steak costs \$5 more than the potatoes and the potatoes cost twice as much as the salad, then how much did each part of the meal cost?
- Convert the number 2012_3 into base-10.
- Convert the number 3645_{10} into Roman numerals.
- Evaluate: (a) $1101001_2 + 101110_2$; (b) $765_8 - 567_8$; (c) $5A_{16} \times 31_{16}$
- Find all x satisfying the following equations.
 - $5x + 4 = 6 \pmod{8}$
 - $2x^2 = 4 \pmod{9}$
 - $4x^2 = 0 \pmod{11}$
 - $x^2 + 2x + 1 = 0 \pmod{8}$
- December 1, 2013 is a Sunday.
 - What day of the week is December 1, 2153?
 - What day of the week is December 1, 1953?
- Find all N between 0 and 1200 satisfying:
$$\begin{aligned}N &\equiv 2 \pmod{11} \\N &\equiv 3 \pmod{13} \\N &\equiv 4 \pmod{15}\end{aligned}$$
- Find the prime factorization of 8250 and 7700.
 - How many divisors does 8250 have (i.e., what is $d(8250)$)?
 - What is $\gcd(8250, 7700)$ and $\text{lcm}(8250, 7700)$? You do not need to simplify the prime factorization.
- Use the Euclidean Algorithm, to calculate $\gcd(3964, 5428)$.
- If 2 chickens can lay 4 eggs in 6 days, then how many eggs will 8 chicken lay in 12 days.

13. If y varies inversely with x , and $x = 3$ when $y = 6$, then what is x when $y = 8$.
14. A couch that costs \$1000 is marked up by 20%. If you purchase this couch with 10% tax, then how much will the couch cost?
15. What is the probability that someone will...
- (a) roll a 6 using one die?
 - (b) roll a 6 using two dice?
 - (c) roll a 6 using three dice?
16. 100 people were asked which of the three sports (baseball, hockey, soccer) they enjoy. These were the results:
- 68 people said they enjoy hockey
 - 60 people said they enjoy baseball
 - 51 people said they enjoy soccer
 - 30 people said they enjoy hockey and soccer, but not baseball
 - 20 people said they enjoy soccer and baseball, but not hockey
 - Everyone liked at least one sport, but no more than two sports.
- (a) How many people enjoy only soccer?
 - (b) How many people enjoy only hockey?
 - (c) How many people enjoy only baseball?
17. Mr. Blue, Mr. Green and Mr. Red each have a car and house that is of the colours blue, green or red. No one has the same colour car or house; nor does anyone have the same colour car as house, house as name, or car as name. The following statement is true: If Mr. Red has a green car or if Mr. Green has a red house, then Mr. Blue has a red house. What colour is each person's car and house?
18. You are taking a large group of students on a field trip. You find out that if you put 17 students on each bus, then 6 students remain, but if you take one bus away then you can divide the students evenly among the remaining buses. How many students are there?
19. Prove that $\sqrt{2}$ is irrational.
20. Prove $\neg(P \vee Q)$ is logically equivalent to $\neg P \wedge \neg Q$.