1. . For a squared expression to equal zero, the expression itself must be zero, so

2. .

3. All palindromes less than 10,000 are 1,2,or 3 digit palindromes

1-digit: all numbers 1 through 9 are palindromes; 9 palindromes

2-digit: can only pick digit 1-9 for the first digit, second digit must the same; 9 palindromes

3-digit: can only pick 1-9 for the first digit, third digit must be the same, can pick digits 0-9 for the second digit; (# of possibilities for first and third digit) \* (# of possibilities for second digit) = (9) \* (10) = 90 palindromes

9 + 9 + 90 = 108

4. The range must be all real values and there can only be one corresponding x-value.

5. i^2 = -1

i^4 = 1

i^17 = (i^4)^4 \* i = i

i^23 = (i^4)^5 \* i^2 \* i = -i

i^14 = (i^4)^3 \* i^2 = -1

i^19 = (i^4)^4 \* i^2 \* i = -i

i - i -1 -i = -1-i

6. Using the formula for the sum of an infinite geometric series with starting term 1 and common ratio ½, .

7. The probability that Hadriel wins is equivalent to 1 minus the probability that Aaron wins. The probability that Aaron wins is equal to the probability that Hadriel misses two shots in a row. Given that Hadriel has a ¼ chance to make a shot, he has a ¾ chance to miss one, so Aaron has a chance to win. Since Aaron has a chance to win, Hadriel has a chance to win.

8. Given that there are 4 distinct letters in the name of the planet, there are 4! ways to arrange these 4 letters, thus the answer is 4\*3\*2\*1 = 24.

9. Function , since the square of an expression can never be less than 0, the value of the function is always greater than or equal to 16.

10. # of total letters = 6

# of repeating letters (aka U) = 4

Number of different words = 6! / 4! = 6 \* 5 = 30

11. B,G, A

143/340 < 1/3 < 195/386

195 \* 401 > 386 \* 201

12. .

13. y = 983x + 7189

x = 983y + 7189

x - 7189 = 983y

y = (x-7189)/983

14. (5x + 6y) - (5)(x + y) = 10 - (5)(2)

5x + 6y - 5x - 5y = 0

y = 0

x = 2

15 .

16. since Cyrus’ age is positive.

17. The vertex of the parabola can be found by plugging in a value of x such that it is equal to where the equation of the parabola is given by . Given that , plugging 3 into the quadratic gives a y-value minimum of 16.

18. sqrt((15 - 55)^2 + (24 - 15)^2) = sqrt(1600 + 81) = 41

19. The inverse and converse cancel with the contrapositive, so the answer is just the original statement, "If Bruce drinks Red Bull, then he will become very good at tennis.”

20. With stars and bars formula, the number of ways is the combination 13C3 = 13\*12\*11/(3\*2)

21. It's the Fibonacci sequence with a first term of 1. Summing the ten first terms, .

22. ; therefore, .

23. The diagonal of the square would need to be the diameter of the circle.

Since the diagonal is 16 units long, the side length is 16/sqrt2 = 8sqrt2.

Area of the square = (8sqrt2)^2 = 128

24. .

25. The probability of getting tails on a coin flip is 1/2

26. (69 + 89)^2 = (158)^2

Since we are only finding the ones digit since dividing by 10 will divide out all the tens, hundreds, and so on, only the last digit matters

8^2 to find the ones digit

8\*8 = 64, so the last digit is 4.

27. (x-7)(x+5) = 0

x = 7, -5

difference = 7 -(-5) = 7 + 5 = 12

28. Formula for a hemisphere = 2/3\*pi \* (r)^3

2/3pi \* 5^3 = 250pi/3

29 is the standard form of the line, adding 4y and subtracting 333 from both sides gives . Dividing by 4 then gives us , so the slope of the line is 5.

30. It's E!!!!!!

31. xy = 40

x + y = 12

(x+y)^3 = 12^3

x^3 + 3(xy)(x+y) + y^3 = 1728

x^3 + (3)(40)(12) + y^3 = 1728

x^3 + 1440 + y^3 = 1728

x^3 + y^3 = 388

32. (x -1)^2 + (y-1)^2 = (x-15)^2 + (y-12)^2

x^2 -2x +1 + y^2 -2y + 1 = x^2 - 30x + 225 + y^2 -24y + 144

22y = 267 - 28x

(267 - 28x)/22 = y

33. The coefficient of x^3 is -6, so the sum of the roots is 6

34. 1 - 2/3 - 4/9 - 40/27 = -39/27