1. C – Since , . Since , . Therefore, .
2. B – 
3. B – For any complex number , . Therefore, .
4. E – Solving for  in the equation  is equivalent to finding all positive, integer solutions to the equation . Therefore, . However, since number bases must be positive, integers, 4 is the only possible answer.
5. C – Since the possible sums are the numbers 2 through 12,  is an integer only if the sum is 2, 4, or 8. Therefore, the probability that  is an integer is the probability that the sum is 2, 4, or 8. Hence,  is the answer.
6. B – (a): , so (a) is false

(b): , so (b) is true

(c): , so (c) is false

(d): false because (c) is false

1. A – Since  and , . Therefore, since every term of  is of the form  ,  for the constant term. Therefore, the constant term is .
2. A – 
3. C – 
4. D – Since ,  
5. B – 
6. B – 
7. B – Since , 
8. E – Since  is a strictly increasing function, 
9. B –  





(note: since  for all real , negative values are disregarded)

1. C –  . Since  is a real number,  cannot equal -1. Therefore,  is the only possible solution.
2. D – Let  denote the rate at which Katie builds a house and  denote the rate at which Zach builds a house. Using the formula  (where  is the number of houses built,  is the rate at which the houses are built, and  is the time that it takes to build the houses),  and . Therefore, the total time to build a house working together would be .
3. A – Since  and , it is sufficient to determine which of  and  is greater to decide who will build the house first. Since , . Therefore,  (since the ln function is strictly increasing). Therefore,  (Note: this last step follows from the previous inequality because ).
4. C – Since ,  .
5. A – Since , .
6. D – Since  , .
7. E – The units digit of  is the same as the units digit of the sum of the units digits of , , and . Also, the units digit of  is the same as the units digit of  (since every term in the expansion of  is divisible by 10 other than the final term). Since the units digit of  is 9 if  is an odd number, the units digit of  is 9. Similarly, the units digit of  is 4 since the units digit of  is 4 if  has a remainder of 2 when divided by 4. Also,  clearly has a units digit of 5. Therefore, since 9+4+5=18, the units digit of the original number is 8.
8. D –   . However, when the solutions are plugged back into the original equation, only -1 and 3 are seen to be valid solutions.
9. A or D – (a) , so (a) is true

(b) , so (b) is true

(c)  , so (c) is true

(d)   clearly does not always equal 1 (at  for example), so (d) is false

1. A –. This clearly is a circle with radius 0. In other words, a point.
2. E – Since , .
3. D – It can be seen through trial and error that . Therefore, .
4. B – Let . Then . Therefore, by subtracting the first equation from the second, we get that . Therefore, .
5. D – Let . Since  and  are consecutive integers with , . As a result, . Since the fraction is repeating, . To solve for , we can multiply the equation by and factor. Therefore,  . However, since  and  are positive integers, . Therefore, .
6. C – 