

Furman Wylie Mathematics Tournament
Senior Exam Answers
February 16, 2002

1. The answer is 4. Such Februarys occur about every 28 years, since you need a leap year in which the first is on a Saturday. This took place in 1908, 1936, 1964, and 1992.
2. The answer is 7.
3. The answer is 2.
4. The answer is $2\sqrt{6}$.
5. The answer is -5050 .
6. The answer is 1, since $x = 4$ is the only solution.
7. The answer is 36. Professor Ab Sentminded bears no resemblance to any of my colleagues.
8. The answer is 60.
9. The answer is 3. Madison is my niece, and her dog is a new golden retriever that she got for Christmas.
10. The answer is 24.
11. The answer is none of the above, since the value of r is actually $1/4$.
12. The answer is $1/6$.
13. The answer is $-1/2$.
14. The answer is 9241.
15. The answer is none of the above, since the poles are really 21 meters apart. I know that some people call them “guide wires”, but they really are supposed to be called “guy wires.”
16. The answer is $3/25$. It’s probably easier to compute the complement and subtract from one.
17. The answer is 13. (Don’t forget to factor out the 25!.)
18. The answer is 2.5%.
19. Since $a = 40$, the answer is that it is congruent to 0 mod 10. Suzan is my wife, and when she says “Guess what, I went to Happy Plants today!” I usually get a sick feeling in my stomach. . . .
20. The answer is 16. Hannah is my palindromically named daughter. There will be a palindromic question about Hannah during the ciphering competition, so be prepared!
21. The answer is none of the above, since the product is actually equal to 1.
22. The answer is 17.
23. The answer is 4. They are $n = 32^2, 40^2, 68^2, \text{ and } 500^2$. Factoring differences of squares is fun!

24. The answer is 12.
25. The answer is 500,050.
26. The answer is $\sqrt{2}$.
27. The answer is $1/3$.
28. The answer is 9.
29. The answer is 2.
30. The answer is 3:38. Sarah and Eleasa are the only two of my daughter's friends who actually live close enough to each other to make this problem possible.
31. The answer is none of the above, since the answer is really zero. Hint: think parity.
32. The answer is 28. The polynomial is $x^3 - x^2 + 5x + 1$.

Bonus No. 1 Among any three consecutive integers, at least one is even, and at least one must be divisible by 3. Thus the product must be divisible by 6.

Bonus No. 2 Applying the last problem to the integers $(n - 1), n, (n + 1)$, we see that the product of these (which is $n^3 - n$) must be divisible by 6. Now $n^3 + 5n = (n^3 - n) + (6n)$, and since both $n^3 - n$ and $6n$ are divisible by 6, their sum is divisible by 6.