STEP Tips

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Tips & tricks to avoid mistakes I made

1. Not recognising difference of two cubes!
2. If a polynomial is of the form $1+x+x^2+....$ (All coefficients 1) or $1-x+x^2-....$ (alternating coefficients), keep difference of n^{th} powers in mind
3. $y^2=-x^2-2x$ and it's ilk are circles. Complete the square to see. A parabola has y^2=degree 1 polynomial in x
4. Square root graphs when they're 0 have infinite gradient so incorporate that in a graph
5. $t\mathbf{r}=s\mathbf{b}$ for vectors implies t=s=0 for non parallel vectors. Very useful. Always say not parallel though when doing vector component comparison, it's a mark each time.
6. Columns of a matrix are the images of 1 0 and 0 1.
7. Magnitude of a vector is $\mathbf{v}.\mathbf{v}$ - this is much better than the root form when you have it in terms of several vectors and don't like components
8. To stay in circular motion, you need to have N or tension if a string is making it do circular motion be positive at the Top. The top is usually the issue with circular motion, the point where it usually stops. If it's constrained in circular motion then $v>0$ at the top.
9. When proving things about period 2 sequences, the conditions for period 1 will necessarily come out. You can single these out by doing the same thing on the original equation to get the necessary condition for period 1!
10. Points of inflection turn the graph like a cubic, reversing the direction it turns in, like N but curly.
11. Restitution is in the line the objects travel in after collision. Always do restitution and momentum in components in the directions they're in.
12. When doing induction, state what values it's valid for like $n\geq 1$. It doesn't hurt to repeat the result either along with its range of values
13. Whenever doing anything with arbitrary indices, think of what the special cases could be, and check for anything like division by 0. Always explain a division by 0 - whether it occurs/doesn't and why. An example for integration would be are you secretly integrating x^{-1}? There are many general rules which you should be checking the exceptions for.
14. Don't forget to label axes!
15. For any condition they give, explain why it is the case.
16. When there are different cases for necessary and sufficient, unite them under one condition
17. Rotational symmetry order 2 means it's an odd function around that position
18. For partial fractions,
19. Two linear terms is constant/linear terms summed
20. Repeated factors, have $\dfrac{C}{(Ax+B)}$ and $\dfrac{D}{(Ax+B)^2}$ - one for both factors over a constant
21. Unfactorable is $\dfrac{Bx+C}{(Dx^2+Ex+F)}$
22. Reflection in 3d matrix is 1 in all except -1 in the diagonal element corresponding to that coordinate (STEP 3 only)
23. Eliminate t in parametric to sketch and use values of t for range of x and y
24. In inequalities, avoid the function arguments where discontinuities happen (e.g $\frac{1}{x}>0$ for $x>0$, not $x\geq 0$)

25. For sequences, consider ratios or differences and look for the point where the ratio flips from being > 1 to < 1 and for differences, look for when it changes from positive to negative.

26. For 2x2 matrices, if the determinant is 0, the image is either a line or just 0. This means one column is a multiple of the other.

27. Remember all matrices commute with I. This means factorising normal matrix quadratic equations such as $X^2 + AX + B$ won't work but if the factorisation is with only I, it will work.

28. For matrices, $AB = 0$ with A, B non zero can happen!