Math 141 Midterm 4

Solution to number 1

1) Find the sum of the series $\sum_{k=1}^{\infty} \frac{(-1)^k 4^{k-1}}{3^{(2k)}}$.

Asking for the sum of the series (as opposed to just whether or not it converged) should have been a hint that this series was either geometric or telescoping (these are most of the instances where we can find the sum exactly). It is clearly geometric with ratio $-\frac{4}{9}$. The first term is $-\frac{1}{9}$ and so the sum converges to $\frac{-\frac{1}{9}}{1-(-\frac{4}{9})} = -\frac{1}{13}$.

As far as grading went, if the student realized it was geometric that was worth about 10 points, with the first term and ratio being worth 5 points each.

If the student didn't realize it was geometric, the usual route was performing the ratio test. If done correctly, this was worth 5 points (even though that only tells you it converges and not the sum itself).