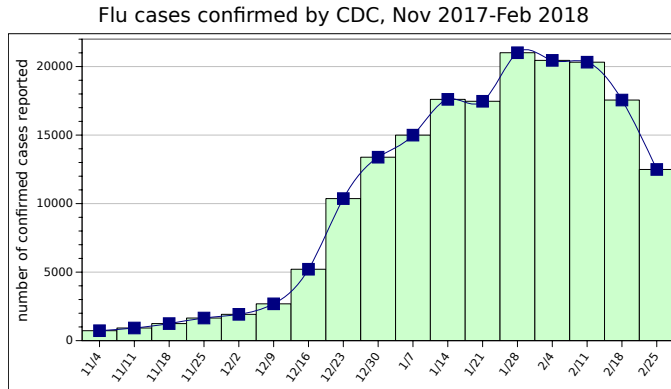


## MAT125, Paper Homework “Flu”

As you are no doubt aware, the flu has been particularly virulent during the the 2017/18 season. Below is data from the Centers for Disease Control<sup>1</sup>, presented both graphically and in a table, giving the number of confirmed cases of influenza reported to the CDC by US Clinical laboratories, each week between November 2017 and February 2018.



week	num. cases	week	num. cases
Nov 4	726	Jan 7	14,996
Nov 11	923	Jan 14	17,607
Nov 18	1,245	Jan 21	17,467
Nov 25	1,650	Jan 28	21,010
Dec 2	1,920	Feb 4	20,451
Dec 9	2,687	Feb 11	20,319
Dec 16	5,210	Feb 18	17,557
Dec 23	10,366	Feb 25	12,491
Dec 30	13,386		

1. During which week was the rate of change of reported cases the greatest? Estimate this rate, in number of additional cases per day; show clearly how you got this estimate.

2. There are two major types of flu present this year (type A and type B); the weekly number of cases of type A virus grew very quickly in December, reaching its maximum rate of change of more than 600 additional cases per day on December 23. In late December, the type B virus made up only about 15% of all cases reported that week; by the end of February, type B accounted for more than 48% of all new cases.

Between the weeks of 2/4 and 2/11, there was little change in the number of reported cases (-132 cases compared to 20,451 reported). However, at that time, the fraction of type B cases was approximately 30% and increasing at a rate of 6% per week. Use the product rule to estimate the change in the number of type B cases between 2/4 and 2/11.

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<sup>1</sup>see <https://www.cdc.gov/flu>