BITL3

Worksheet 26

9 December 2021

Math Lab

1. **Warm up:** Answer the following True / False questions.

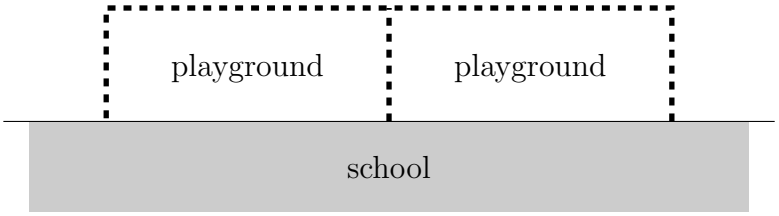
   (a) If f is defined at a, then f must be either concave up or concave down at a.

   (b) If the second derivative of f exists at a, then the first derivative of f must exist at a.

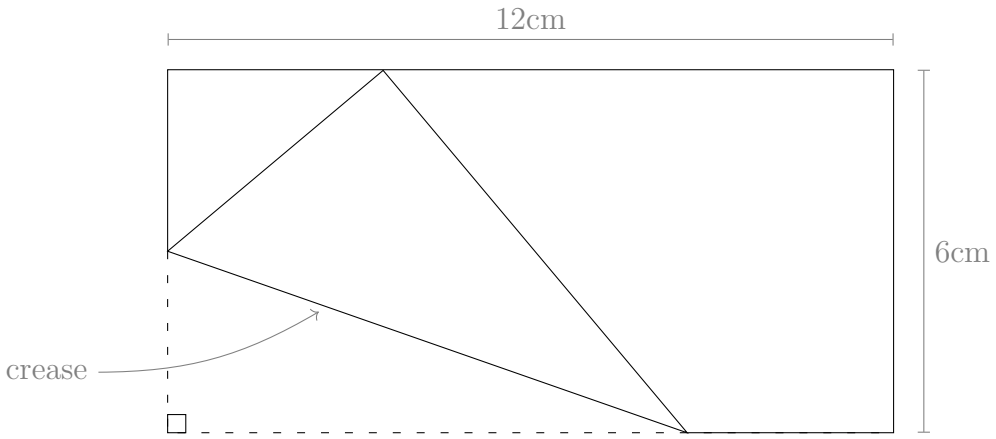
   (c) If f has an asymptote at a, then f changes concavity at a.

   (d) If the second derivative has an asymptote at a, then the first derivative has an asymptote at a.

2. Two rectangular playgrounds are to be built adjacent to a school. Two hundred meters of fencing are to be used for all sides, including the middle fence as in the picture. Find the dimensions that will maximize the area of the two playgrounds together.



3. A rectangular piece of paper is 12 cm wide and 6 cm high. The lower right-hand corner is folded over to reach the left edge of the paper, as in the picture below. What is the smallest possible length for the crease?



4. Find a formula for each of the following sequences, and determine if they converge or diverge. The first term given in each sequence is for $n = 1$.

   (a) $16, 25, 36, 49, \ldots$

   (b) $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \ldots$

   (c) $1, \frac{-1}{4}, \frac{1}{27}, \frac{-1}{256}, \ldots$

   (d) $-1, 1, -1, 1, -1, 1, \ldots$

   (e) $0, 1, 0, 1, 0, \ldots$

   (f) $1, 1, 2, 2, 3, 3, 4, \ldots$