

Names: _____

Activity #7: Extrema

Calculus I

1. Find the global extrema of the following functions on the indicated domain.

(a) $f(x) = \frac{4}{5}x - 2$ on $D = [-5, 2]$.

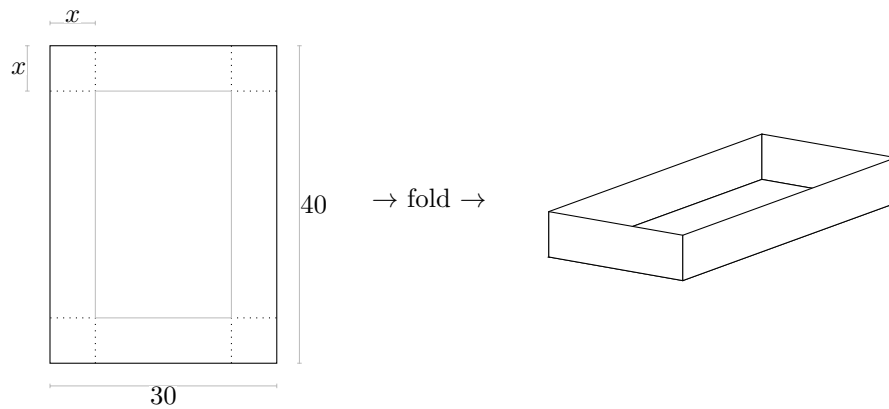
(b) $g(x) = (x - 1)^2 - 3$ on $D = [-1, 3]$.

(c) $h(t) = \sqrt{x + 2}$ on $D = [5, 7]$.

(d) $f(x) = \sin(x^2)$ on $D = [-2, 2]$.

(e) $f(x) = \begin{cases} 4 - 2x & \text{if } x \leq 1 \\ x + 1 & \text{if } x > 1 \end{cases}$

2. A rectangular sheet of aluminum, measuring 30 cm by 40 cm, is to have squares of side length x cut out of its corners. Then the sheet will be folded along the gray lines to form a rectangular tray as shown in the following diagram.



Find the value of x which maximizes the volume of the tray.

3. Look at the plot of the function

$$f(x) = \frac{1}{8}x^8 - \frac{1}{2}x^6 - x^5 + 5x^3.$$

- (a) Make a conjecture: where does it appear that f has local and global extrema?
- (b) Now use the method we developed in class to find the local extrema of f .
- (c) Does the number of extrema you found in (2) agree with your conjecture in (1)? If not, why not?