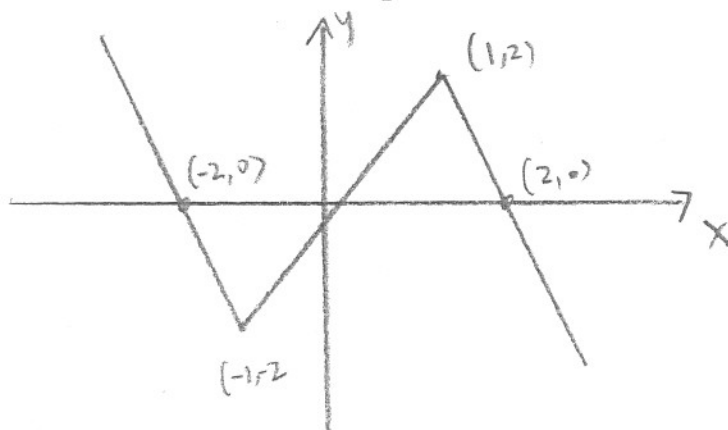


Some Interesting Problems - Set 3

- (Math 80) If Alice will be  $x$  years old  $y$  years from now, how old will she be  $z$  years from now.
- (Math 99) The ages of a wife and husband add to 98. He's twice as old as she was when he was the age she is today. What are their ages?
- (Math 110) Warehouse A and Warehouse B are 30 miles apart. Warehouse A charges twice as much per mile for delivery as does Warehouse B. Describe the set of locations where it is cheaper to receive a delivery from Warehouse A.
- (Math 110) The function  $f(x)$  has period 4. The graph of one period of  $f(x)$  is shown below. Sketch a graph of the function  $y = \frac{1}{2}(f(x-1) + f(x+3))$



- (Math 126) The base of a solid is the region bounded by the parabola  $y = x^2$  and the line  $y = 1$ . Cross-sections perpendicular to the  $y$ -axis are equilateral triangles. Determine the volume of the solid by taking slices perpendicular to the  $x$ -axis.
- (Math 207) Describe the family of curves orthogonal to the family of circles passing through the points  $(0, 1)$  and  $(0, -1)$ .
- (Math 208) Define a map  $T$  from the set of lines in  $\mathbf{R}^2$  to  $\mathbf{R}^3$  by  $T(L) = (a, b, c)$ , where  $ax + by = c$  is an equation for line  $L$ . Note that  $T$  is not a function since there are an infinite number of ways to represent an equation of a given line in standard form. Let  $P$  denote the set of lines passing through a fixed point. Is  $T(P) \cup \{(0, 0, 0)\}$  a subspace of  $\mathbf{R}^3$ ? If so, what is the dimension of this subspace?