

**Extra bonus problems**

1. Is there a function defined on the real line whose graph is dense on the plane? This means that for every non-empty disk  $D$  on the plane there is an  $x \in \mathbb{R}$  so that the point  $(x, f(x))$  is in the disk.
2. Is there non-constant function  $f$  for which  $f(x + 1) = f(x) = f(x + \sqrt{2})$  for all  $x$ ?