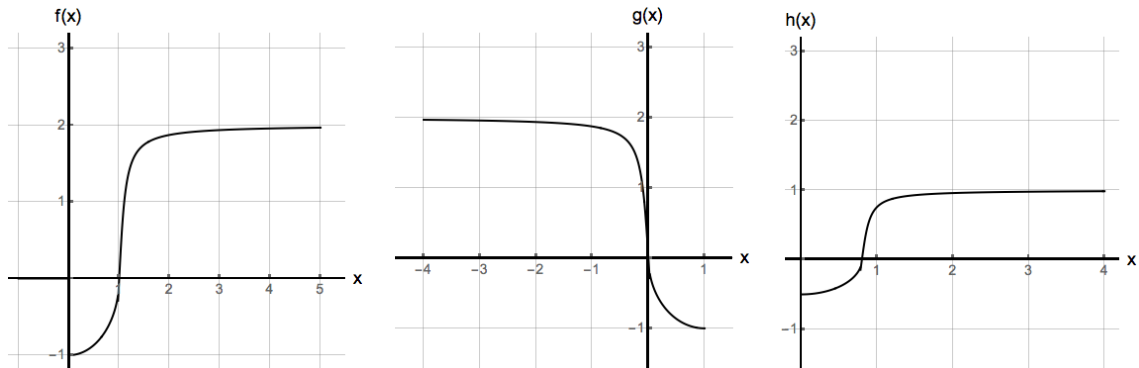


8. [9 points]

a. [4 points] Let $f(x)$, $g(x)$ and $h(x)$ be the functions shown below

Find formulas for the functions $g(x)$ and $h(x)$ as transformations of the function $f(x)$. A list of possible answers is shown below. If the correct answer is not included in the list, write your own formula in terms of transformations of the function $f(x)$.

$\frac{1}{2}f\left(\frac{4}{5}x\right)$

$-f(x+1)$

$f(-x-1)$

$2f\left(\frac{5}{4}x\right)$

$f(-x+1)$

$2f\left(\frac{4}{5}x\right)$

$\frac{1}{2}f\left(\frac{5}{4}x\right)$

$-f(x-1)$

Solution: $g(x) = f(-x+1)$

$$h(x) = \frac{1}{2}f\left(\frac{5}{4}x\right)$$

b. [5 points] A bookstore keeps an e-mail list of its regular customers. The list had 250 and 750 e-mail addresses in 2004 and 2010 respectively. Let $M(t)$ be the number of e-mail addresses in the list t years after 2000. Suppose $M(t)$ is a power function. Find a formula for $M(t)$. Your answer must be written in **exact form**. Show all your work.

Solution: Let $M(t) = kt^p$, then the points $(4, 250)$ and $(10, 750)$ are in the graph of $M(t)$ then

$$250 = k(4)^p \quad 750 = k(10)^p$$

$$3 = (2.5)^p \quad \text{then} \quad p = \frac{\ln(3)}{\ln(2.5)}$$

$$k = \frac{250}{4^p} = \frac{250}{4^{\frac{\ln(3)}{\ln(2.5)}}}$$

$$M(t) = \left(\frac{250}{4^{\frac{\ln(3)}{\ln(2.5)}}} \right) t^{\frac{\ln(3)}{\ln(2.5)}}$$