$$MSE_{\hat{g} \text{ at } x=1} = \sum_{i=0}^{1} (\hat{g}_i - \hat{g}_{mean})^2$$

$$= \left(0 - \tfrac{1}{2}\right)^2 + \left(1 - \tfrac{1}{2}\right)^2$$

$$= \tfrac{1}{2} = 0.5$$

$$\therefore \quad MSE \text{ of } \hat{f} > MSE \text{ of } \hat{g}$$

So, the MSE of $\hat{g}$ is smaller than that of $\hat{f}$.

For $\hat{g}$ at $x = 1$:-

$$Bias^2 = E\left[\left(E\left[\hat{g}(X=1) \mid (X=1)\right]\right) - f\left((X=1) \mid (X=1)\right)\right)^2\right]$$

$$= E\left[\left(\tfrac{1}{2} - (1)\right)^2\right] = \frac{1}{4} \Rightarrow Bias = \frac{1}{2}$$

$$Variance = E\left[\left(\left(\hat{g}(X=1) \mid (X=1)\right) - E\left[\hat{g}(X=1) \mid (X=1)\right]\right)^2\right]$$

$$= E\left[\left(\hat{g}(X=1) \mid (X=1)\right)^2 + \left(\tfrac{1}{2}\right)^2 - 2 \cdot \tfrac{1}{2} \cdot \left(\hat{g}(X=1) \mid (X=1)\right)\right]$$

$$= E\left[\left(\hat{g}(X=1) \mid (X=1)\right]^2 + \frac{1}{4} - E\left[\hat{g}(X=1) \mid (X=1)\right]$$

$$= \frac{1}{4} - \frac{1}{2} + \left\{ (0)^2 \times \frac{1}{2} + (1)^2 \times \frac{1}{2} \right\} = \frac{1}{4}$$

Bias > Variance

$\Rightarrow$ Bias is a bigger contributor than variance.