HINTS OF HW4
MATH 185

7. You don't have to prove the "moreover" part (it's much harder than proving the inequality). Send Yu-Wei an email if you prove the "moreover" part; the first person who completely prove it will get **extra 5 points** for this homework.

Hint for proving the inequality: First show that for any $0 < r < 1$, we have

$$2f'(0) = \frac{1}{2\pi i}\int_{C_r} \frac{f(w) - f(-w)}{w^2} dw,$$

where C_r is the circle of radius r centered at 0 (oriented positively).

11. For $z \neq 0$ (the case $z = 0$ can be proved separately), show that if $w = Re^{i\varphi}$, then

$$\mathrm{Re}\left(\frac{Re^{i\varphi} + z}{Re^{i\varphi} - z}\right) = \frac{1}{2}\left(\frac{w+z}{w-z} + \frac{(R^2/\bar{z}) + w}{(R^2/\bar{z}) - w}\right).$$

Then apply Cauchy integral formula to compute the integral.

12. There is a typo in 12(b): the equation should be

$$u(z) = \frac{1}{2\pi}\int_0^{2\pi} P_r(\theta - \varphi) u(e^{i\varphi}) d\varphi.$$