10. a) $\tan\frac{\theta}{2} = \frac{\sqrt{r^2-100}}{10}$

$10\tan\frac{\theta}{2} = \sqrt{r^2-100}$

$100\tan^2\frac{\theta}{2} = r^2-100$

$r^2 = 100\tan^2\frac{\theta}{2} + 100$

$r = 10\sqrt{\tan^2\frac{\theta}{2} + 100}$

ii. $\sin\frac{\theta}{2} = \frac{r}{20}$

$\therefore r = 20\sin\frac{\theta}{2}$

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10.(b) $I = \dfrac{1}{b^2+(x+8)^2} + \dfrac{1}{b^2+(x-8)^2}$

$= (b^2+x^2+16x+64)^{-1} + (b^2+x^2+64)^{-1}$

$\dfrac{dI}{dx} = \dfrac{-(2x+16)}{(b^2+(x+8)^2)^2} + \dfrac{-2x-16}{(b^2+(x-8)^2)^2}$

$= -\dfrac{(2x+16)(b^2+(x-8)^2)^2 + (2x-16)(b^2+(x+8)^2)^2}{(b^2+(x+8)^2)^2(b^2+(x-8)^2)^2}$

$= -2\left[\dfrac{(x+8)(b^2+(x-8)^2)^2 + (x-8)(b^2+(x+8)^2)^2}{(b^2+(x+8)^2)^2(b^2+(x-8)^2)^2}\right]$

$\therefore \dfrac{dI}{dx} = \dfrac{-2P}{Q}$

where $P = \left[(x+8)(b^2+(x-8)^2)^2 + (x-8)(b^2+(x+8)^2)^2\right]$

and $Q = (b^2+(x+8)^2)^2(b^2+(x-8)^2)^2$

ii. Stat. pts when $\dfrac{dI}{dx} = 0$

$-2\left[\dfrac{(x+8)(b^2+(x-8)^2)^2 + (x-8)(b^2+(x+8)^2)^2}{(b^2+(x+8)^2)^2(b^2+(x-8)^2)^2}\right] = 0$

$0 = 2\left[(x+8)(b^2+(x-8)^2)^2 + (x-8)(b^2+(x+8)^2)^2\right]$

$= 2\left[x+8(b^2+x^2-16x+64)^2 + x-8(b^2+x^2+16x+64)^2\right.$