

1- $\cos r u = 1 - r \sin^2 u \rightarrow r \sin^2 u + \cos r u - r = 0 \Rightarrow \sin^2 u + r \sin u - r = 0$
 $\sin u = \frac{1}{r} \Rightarrow u = k\pi + \frac{\pi}{2}, u = k\pi + \frac{3\pi}{2}$
 1- ب) $\cos r u = r \cos^2 u - 1 \Rightarrow r \cos^2 u + \cos u - r = 0 \rightarrow \cos u = \frac{r}{r} \times$
 $\cos u = 1 \Rightarrow u = k\pi$

2- الف) $\sin r u = \cos r u \Rightarrow \sin^2 u = \cos^2 u \Rightarrow -\cos r u = r \sin r u \cos r u \xrightarrow{\cos r u \neq 0}$
 $-1 = r \sin r u \Rightarrow \sin r u = -\frac{1}{r} \Rightarrow r u = k\pi - \frac{\pi}{2} \Rightarrow u = k\pi - \frac{\pi}{2r}$
 $r u = k\pi + \pi - \frac{\pi}{2} \Rightarrow u = k\pi + \frac{\pi}{2r}$
 $\cos r u = 0 \rightarrow r u = k\pi \Rightarrow u = k\pi$

2- ب) $r \cos^2 u - 1 = -r \sin u \cos u \Rightarrow \cos r u = -\sin r u \Rightarrow \cos r u = \sin(-r u) = \cos(\frac{\pi}{2} + r u)$
 $r u = k\pi \pm (\frac{\pi}{2} + r u) \rightarrow r u = k\pi + \frac{\pi}{2} + r u \Rightarrow \text{GGE}$
 $r u = k\pi - \frac{\pi}{2} - r u \Rightarrow r u = k\pi - \frac{\pi}{2} \Rightarrow u = \frac{k\pi}{r} - \frac{\pi}{2}$

3- الف) $\frac{\cos u}{\sin u} (r \cos u + 1) = \frac{1}{\sin u} \xrightarrow{\sin u \neq 0} r \cos^2 u + \cos u - 1 = 0 \xrightarrow{\text{رابطه بین ضلعها}} \cos u = -1$
 $\cos u = -1 \Rightarrow u = k\pi + \pi \quad \cos u = \frac{1}{r} \Rightarrow u = k\pi + \pi \pm \frac{\pi}{r}$

3- ب) $\sin r u + \sin^2 u + \cos r u = \sin u \cos u = r \Rightarrow -\sin u \cos u = \cos r u \xrightarrow{\cos u \neq 0} -\sin u = \cos u$
 $\sin(-u) = \cos u \Rightarrow \cos(\frac{\pi}{2} + u) = \cos u \Rightarrow u = k\pi + \frac{\pi}{2} + u \quad \text{GGE}$
 $u = k\pi - \frac{\pi}{2} - u \Rightarrow r u = k\pi - \frac{\pi}{2} \Rightarrow u = \frac{k\pi}{r} - \frac{\pi}{2}$
 $\cos u = 0 \Rightarrow k\pi \quad \text{حاصل: } k\pi - \frac{\pi}{2} \cup k\pi$

4- الف) $\cos(u - \frac{\pi}{2}) = \cos(\frac{\pi}{2} - u) \Rightarrow \cos(\frac{\pi}{2} + u) \cos(\frac{\pi}{2} - u) = \frac{1}{r} \Rightarrow \cos(\frac{\pi}{2} + u) \sin(\frac{\pi}{2} + u) = \frac{1}{r}$
 $\Rightarrow \frac{1}{r} \sin(\frac{\pi}{2} + r u) = \frac{1}{r} \Rightarrow \cos r u = \frac{1}{r}$
 $r u = k\pi \pm \frac{\pi}{r} \Rightarrow u = k\pi \pm \frac{\pi}{r}$

4- ب) $\cos(r u - \frac{\pi}{2}) = -\sin r u = \sin(-r u) = \cos(\frac{\pi}{2} + r u) \Rightarrow \cos(r u - \frac{\pi}{2}) = \cos(\frac{\pi}{2} + r u)$
 $r u - \frac{\pi}{2} = k\pi + r u + \frac{\pi}{2} \Rightarrow \text{GGE}$
 $r u - \frac{\pi}{2} = k\pi - r u - \frac{\pi}{2} \Rightarrow r u = k\pi - \frac{\pi}{r} + \frac{\pi}{2} \Rightarrow u = \frac{k\pi}{r} - \frac{\pi}{2r}$

5- $\frac{r \sin r u \cos r u + \sin r u}{\sin r u} = \cos r u + \sin r u \Rightarrow r \cos r u + 1 = 1 \Rightarrow \cos r u = 0 \Rightarrow r u = k\pi + \frac{\pi}{2}$
 $u = \frac{k\pi}{r} + \frac{\pi}{2r}$
 $\sin r u = 0 \Rightarrow r u = k\pi \Rightarrow u = \frac{k\pi}{r} \xrightarrow{\text{اشتراک ندارد}} \text{مجموع جواب: } \frac{k\pi}{r} + \frac{\pi}{2r}$

6- $\frac{\sin a}{1 + \cos a} + \tan \frac{a}{r} \Rightarrow \frac{\sin \frac{a}{r}}{1 + \cos \frac{a}{r}} + \tan \frac{a}{r} \quad \frac{1}{\sin \frac{u}{r}} + \frac{\cos \frac{u}{r}}{\sin \frac{u}{r}}, \frac{1 + \cos \frac{u}{r}}{\sin \frac{u}{r}}, \cot \frac{u}{r}$
 $\tan \frac{u}{r} = \cot \frac{u}{r} \Rightarrow \tan(\frac{\pi}{2} - \frac{u}{r}) \Rightarrow \frac{u}{r} = k\pi + \frac{\pi}{r} - \frac{u}{r} \Rightarrow \frac{u}{r} = k\pi + \frac{\pi}{r} \Rightarrow u = k\pi + \pi$
 $\text{در بازه } [0, 2\pi] \rightarrow -\pi, \pi \Rightarrow |\pi - (-\pi)| = 2\pi$

$$7. -\sin^2 u \cos^2 u + 1 - \cos^2 u \Rightarrow -\sin^2 u \cos^2 u + \sin^2 u \xrightarrow{\sin u \neq 0} -\cos^2 u + 1 \Rightarrow \cos^2 u = -1$$

$$\cos u = k\pi + \pi \Rightarrow u = \frac{k\pi}{\pi} + \frac{\pi}{\pi}$$

$$\sin^2 u = 0 \Rightarrow \sin u = 0 \Rightarrow u = k\pi$$



نقطه $\Rightarrow$ (البته 0 و 2π) نقطه 4 بار حساب کنیم

$$8. \frac{1 - \tan u}{1 + \tan u} = \tan\left(\frac{\pi}{4} - u\right) \Rightarrow \tan\left(\frac{\pi}{4} - u\right) = \tan ku \Rightarrow ku = k\pi + \frac{\pi}{4} - u \Rightarrow ku = k\pi + \frac{\pi}{4}$$

$$u = \frac{k\pi}{4} + \frac{\pi}{14}$$

$$9. 1 + \sin^2 u = (\sin u + \cos u)^2 \Rightarrow \sqrt{1 + \sin^2 u} = |\sin u + \cos u| \xrightarrow{0 \leq u \leq \pi} \sin u + \cos u = \sqrt{2} \sin\left(u + \frac{\pi}{4}\right)$$

$$\sqrt{2} \sin\left(u + \frac{\pi}{4}\right) = \sqrt{2} \cos^2 u \Rightarrow \sin\left(u + \frac{\pi}{4}\right) = \cos\left(\frac{\pi}{2} - \frac{\pi}{4} - u\right) = \cos\left(\frac{\pi}{4} - u\right) = \cos^2 u$$

$$\Rightarrow ku = k\pi + \frac{\pi}{4} - u \Rightarrow ku = k\pi + \frac{\pi}{4} \Rightarrow u = \frac{k\pi}{4} + \frac{\pi}{12}$$

$$ku = k\pi - \frac{\pi}{4} + u \Rightarrow u = k\pi - \frac{\pi}{4}$$



$$10. \text{الف) } \sin^2 u - \cos^2 u = \sin^2 u - \cos^2 u = 1 \Rightarrow -\cos^2 u = 1 \Rightarrow \cos^2 u = -1 \Rightarrow ku = k\pi + \pi$$

$$u = k\pi + \frac{\pi}{2}$$

10. ب)

سلام خسته نباشید. بیجستیر من هفته ی پیش سوال ۱۰ رو نوشتم و سفید گذاشتم ولی شما بفره شو به من داده بودید
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خیلی ممنونم ♡