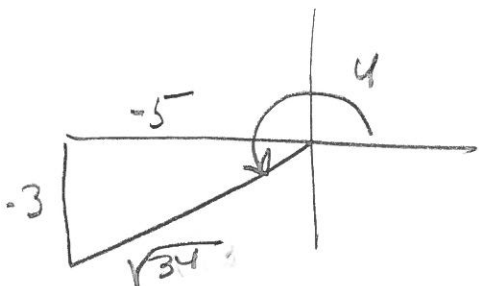


122 TEST 2 SPRING, 2018

① KIND

② $\tan u = \frac{3}{5}$ & $\sin u < 0$



$$25 + 9 = 34$$

$$\sin u = \frac{-3}{\sqrt{34}}$$

$$\csc u = -\frac{\sqrt{34}}{3}$$

$$\cos u = \frac{-5}{\sqrt{34}}$$

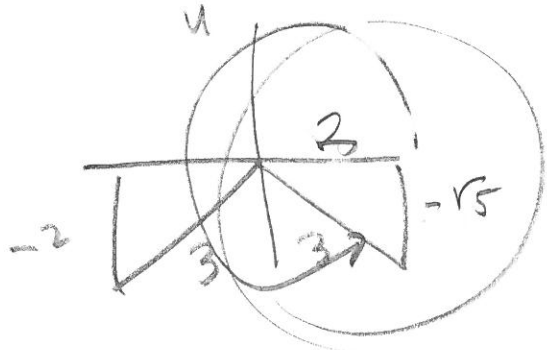
$$\sec u = -\frac{\sqrt{34}}{5}$$

$$\tan u = \frac{3}{5}$$

$$\cot u = \frac{5}{3}$$

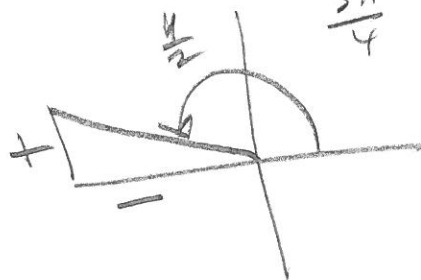
③ $\sin u = \frac{\sqrt{5}}{3}$ & $\tan u < 0$

$$9 - 5 = 4 \rightarrow \sqrt{4} = 2$$



$$\text{Q IV} : \frac{3\pi}{2} < u < 2\pi$$

$$\frac{3\pi}{4} < \frac{u}{2} < \pi$$



$$\sin\left(\frac{u}{2}\right) = \sqrt{\frac{1 - \cos u}{2}}$$

$$= \sqrt{\frac{1 - \frac{1}{3}}{2}} = \sqrt{\frac{\frac{2}{3}}{2}}$$

$$= \sqrt{\frac{1}{3}} = \frac{\sqrt{3}}{3} = \sin \frac{u}{2}$$

③ Critical

$$\cos \frac{u}{2} = -\sqrt{\frac{1 + \cos u}{2}} = -\sqrt{\frac{1 + \frac{2}{3}}{2}}$$

$$= -\sqrt{\frac{5}{6}} = -\frac{\sqrt{5}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \boxed{\frac{\sqrt{30}}{6} = \cos \frac{u}{2}}$$

$$\Rightarrow \tan \frac{u}{2} = \frac{\sqrt{6}}{6} \cdot \frac{6}{\sqrt{30}} = \frac{\sqrt{6}}{\sqrt{30}} = \sqrt{\frac{1}{5}} = \boxed{\frac{\sqrt{5}}{5} = \tan \frac{u}{2}}$$

④ $3\tan^3 x - 3\tan^2 x - \tan x + 1 = 0$

$$3u^3 - 3u^2 - u + 1 = 0$$

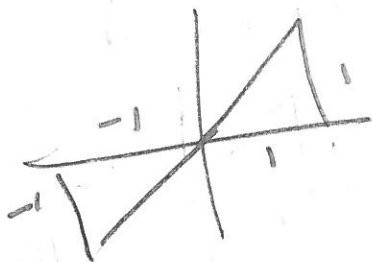
$$3u^2(u-1) - 1(u-1) = 0$$

$$(u-1)(3u^2-1)$$

$$u=1 \quad u = \pm \frac{1}{\sqrt{3}}$$

$$u^2 = \frac{1}{3}$$

$$u = \pm \sqrt{\frac{1}{3}} = \pm \frac{1}{\sqrt{3}}$$

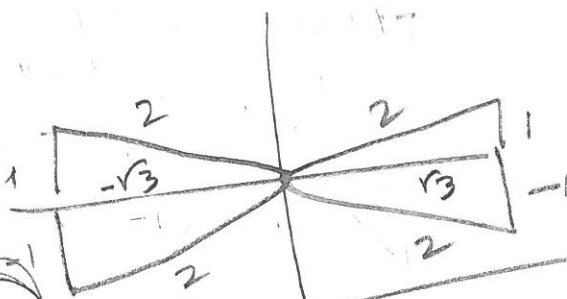


$$u=1$$

$$\tan x = 1$$

$$x = \frac{\pi}{4}, \frac{5\pi}{4}$$

$$= 45^\circ, 225^\circ$$



$$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$= 30^\circ, 150^\circ, 210^\circ, 330^\circ$$

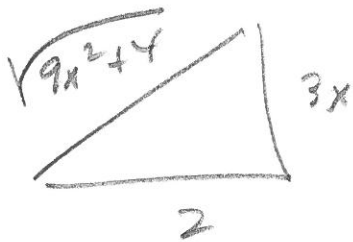
4b

$$\frac{\pi}{4} + n\pi, n \in \mathbb{Z}$$

$$\frac{\pi}{6} + n\pi, n \in \mathbb{Z}$$

$$\frac{5\pi}{6} + n\pi, n \in \mathbb{Z}$$

$$\textcircled{5} \quad \sin\left(\arctan\left(\frac{3x}{2}\right)\right) = \sin \theta = \frac{3x}{\sqrt{9x^2+4}}$$



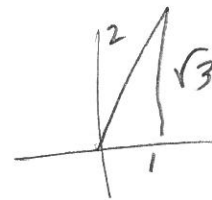
$$\textcircled{6} \quad \cos\left(\frac{7\pi}{12}\right) =$$

$$\textcircled{a} \quad \cos\left(\frac{3\pi + 4\pi}{12}\right) = \cos\left(\frac{\pi}{4} + \frac{\pi}{3}\right)$$

$$= \cos\frac{\pi}{4} \cos\frac{\pi}{3} - \sin\frac{\pi}{4} \sin\frac{\pi}{3}$$

$$= \left(\frac{1}{\sqrt{2}}\right)\left(\frac{1}{2}\right) - \left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{2}\right) =$$

$$= \frac{1 - \sqrt{3}}{2\sqrt{2}} = \cos\frac{7\pi}{12}$$



122 T2

(6b) $\cos\left(\frac{7\pi}{12}\right) = \cos\left(\frac{1}{2} \cdot \frac{7\pi}{6}\right)$

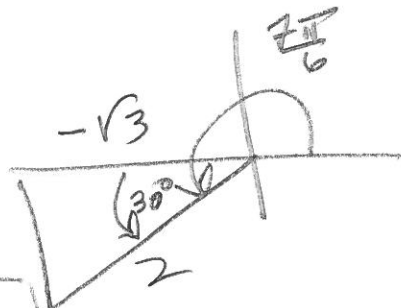
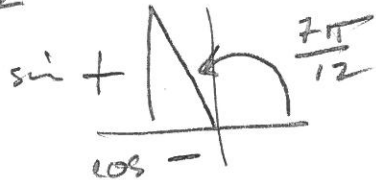
$$= -\sqrt{\frac{1 + \cos\left(\frac{7\pi}{6}\right)}{2}}$$

$$= -\sqrt{\frac{1 - \frac{\sqrt{3}}{2}}{2}}$$

$$= -\sqrt{\frac{2 - \sqrt{3}}{4}}$$

$$= -\frac{\sqrt{2 - \sqrt{3}}}{2} = \cos\frac{7\pi}{12}$$

$\frac{7\pi}{12} = 105^\circ \in \text{QII}$



(7) $\cos(\arctan x - \arcsin x) = \cos(u - v) = \cos(u + (-v))$

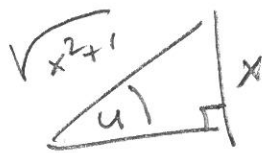
$$= \cos u \cos(-v) - \sin u \sin(-v)$$

$$= \cos u \cos v + \sin u \sin v$$

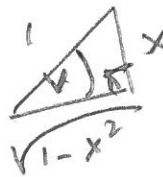
$$= \frac{1}{\sqrt{x^2+1}} \cdot \frac{\sqrt{1-x^2}}{1} + \frac{x}{\sqrt{x^2+1}} \cdot x$$

$$= \frac{\sqrt{1-x^2} + x^2}{\sqrt{x^2+1}}$$

$u = \arctan x$

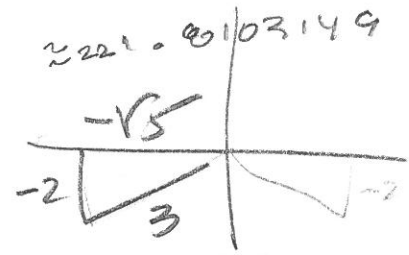


$v = \arcsin x$



122 T2

(8) $\sin u = -\frac{2}{3}, \tan u > 0$



$\Rightarrow \sin(2u) = 2\sin u \cos u$

$= 2\left(-\frac{2}{3}\right)\left(-\frac{\sqrt{5}}{3}\right) = \frac{4\sqrt{5}}{9} = \sin(2u)$
.99380799

$\cos(2u) = \cos^2 u - \sin^2 u =$

$= \left(-\frac{\sqrt{5}}{3}\right)^2 - \left(-\frac{2}{3}\right)^2 = \frac{5}{9} - \frac{4}{9} = \frac{1}{9} = \cos(2u)$

$\tan(2u) = \left(\frac{4\sqrt{5}}{9}\right)\left(\frac{9}{1}\right) = 4\sqrt{5} = \tan(2u)$

(B1)

$s = r\theta$

$d = 20 \text{ cm}, s = 300 \text{ m}$

$r = 10 \text{ cm}$

$(300 \text{ m})\left(\frac{100 \text{ cm}}{\text{m}}\right)$

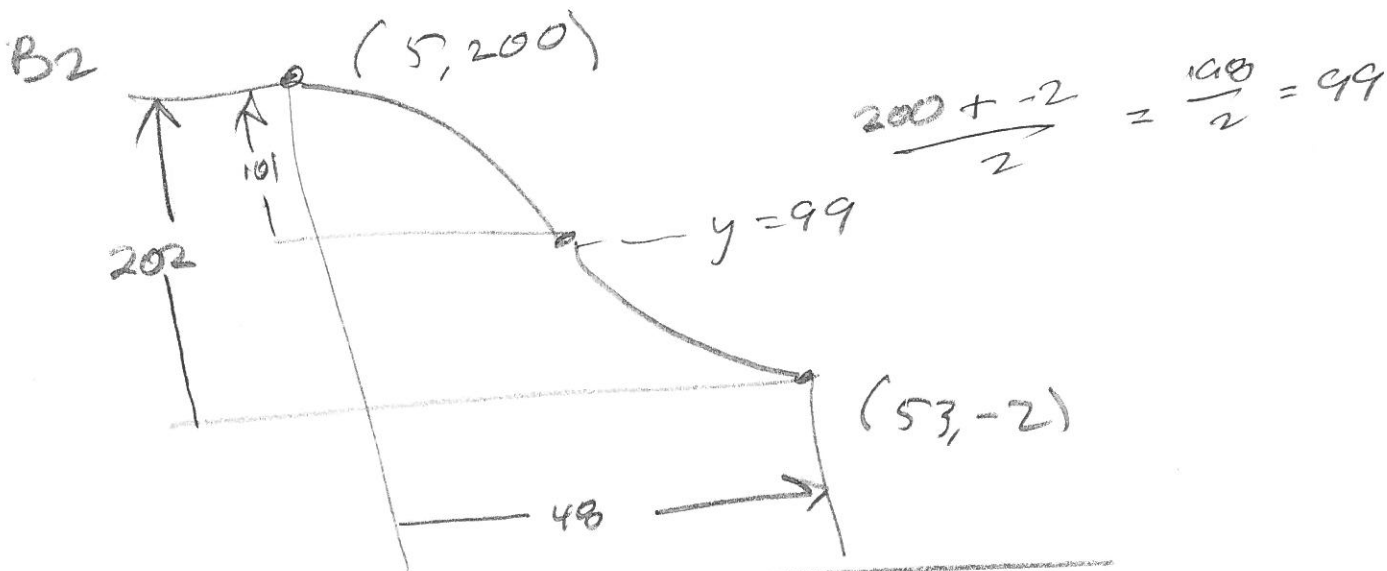
$= (10 \text{ cm})\theta$

$\theta = \frac{(300)(100)}{10} = 3000 \rightarrow$

of revs = $\frac{3000 \text{ radians}}{2\pi \text{ radians/rev}}$

$= \frac{1500}{\pi} \text{ revs}$

122 T2



$$f(x) = 101 \sin\left(\frac{\pi}{48}(x-5)\right) + 99$$

B3

$$s = r\theta = (60)(300^\circ)\left(\frac{\pi \text{ radians}}{180^\circ}\right)$$

$$= \frac{(60)(30)\pi}{18} = \frac{1800\pi}{18} = 100\pi \text{ cm}^2$$

