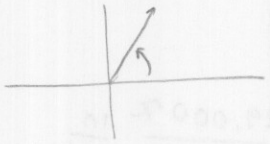
Homework 5 Solutions

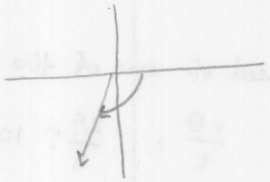
Section 9.1

Odds.

23. a) $\pi/3$



b) $-\frac{2\pi}{3}$



25. a) $\frac{11\pi}{6}$

b) -3

$-3 = -\frac{3}{\pi}\pi$

$\approx -\pi$

57. a) $30° \times \frac{\pi}{180} = \boxed{\frac{\pi}{6}}$

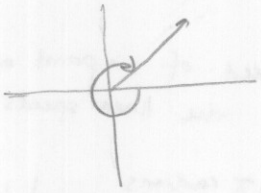
b) $45° \times \frac{\pi}{180} = \boxed{\frac{\pi}{4}}$

63. a) $\frac{5\pi}{6} \times \frac{180}{\pi} = \boxed{150°}$

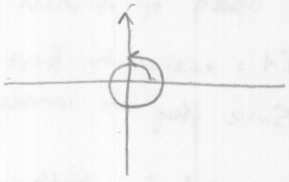
b) $-\frac{7\pi}{3} \times \frac{180}{\pi} = \boxed{-420°}$

Evens

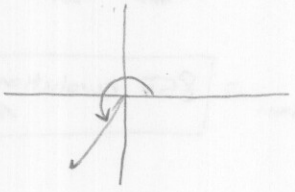
24. a) $-\frac{7\pi}{4}$



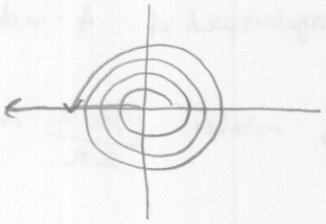
b) $\frac{5\pi}{2}$



26. a) $4 = \frac{4}{\pi}\pi \approx 4/3\,\pi$



b) 7π



58. a) $315° \times \frac{\pi}{180} = \boxed{\frac{7\pi}{4}}$

b) $120° \times \frac{\pi}{180} = \boxed{\frac{2\pi}{3}}$

62. a) $-\frac{7\pi}{12} \times \frac{180}{\pi} = \boxed{-105°}$

b) $\frac{\pi}{9} \times \frac{180}{\pi} = \boxed{20°}$

106. Saw has 7¼ inch diameter blade
Makes 5000 revolutions per minute

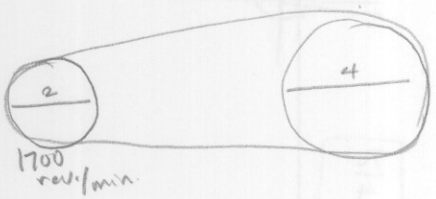
a) Angular speed: 5000 revolutions per minute × 2π radians per revolution = $\boxed{10{,}000\pi \text{ radians/min}}$

b) Linear speed of one of the cutting teeth:

$$\frac{r\theta}{t} = \frac{29}{8}\text{in} \cdot 10{,}000\pi \frac{\text{radians}}{\text{min}} = \frac{29{,}000\pi}{8} \frac{\text{in}}{\text{min}}$$

$$= \frac{29{,}000\pi}{8 \cdot 12} \frac{\text{feet}}{\text{min}} = \boxed{\frac{3625\pi}{12} \text{ ft/min}}$$

108.



a) Angular speed of 2-inch pulley:

$$1700 \frac{\text{revolutions}}{\text{min}} \times 2\pi \frac{\text{radians}}{\text{revolution}} = \boxed{3400\pi \frac{\text{radians}}{\text{min}}}$$

Angular speed of 4-inch pulley:

It's easier to first find linear speed of a point on the edge of each pulley. Since they are connected by a belt, the linear speeds are the same.

Linear speed of both pulleys $3400\pi \frac{\text{radians}}{\text{min}} \times 1 \text{ in} = 3400\pi \text{ inches/min}$

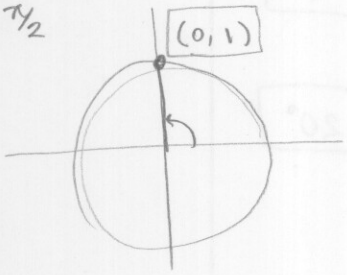
Angular speed of 4-inch pulley: $3400\pi \text{ in/min} \times \frac{1}{2 \text{ in}} = \boxed{1700\pi \text{ radians/min}}$

b) The saw rotates $\frac{1700\pi}{2\pi} \frac{\text{radians}}{\text{min}} \times \frac{\text{rev.}}{\text{radians}} = \boxed{850 \text{ revolutions/min}}$

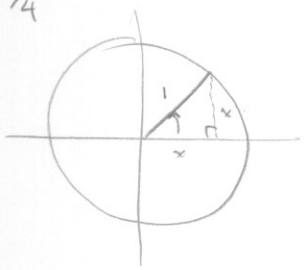
Section 7.2

Odds

9. $t = \pi/2$



17. $t = \pi/4$



$x^2 + x^2 = 1$

$2x^2 = 1$

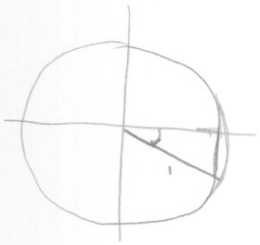
$x^2 = \frac{1}{2}$, so $x = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$.

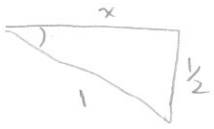
so $\sin\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$

$\cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$

and $\tan\left(\frac{\pi}{4}\right) = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1$

19. $t = -\pi/6$





$1^2 = \left(\frac{1}{2}\right)^2 + x^2$

$1 = \frac{1}{4} + x^2$

$x = \frac{\sqrt{3}}{2}$

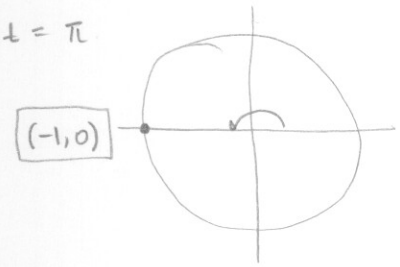
So $\sin\left(-\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$

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

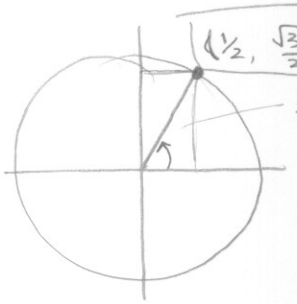
$\tan(-\pi/6) = \frac{\sqrt{3}}{2} \cdot \frac{-2}{1} = -\sqrt{3}$

Evens.

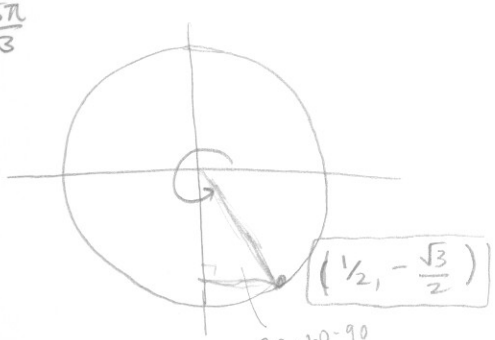
10. $t = \pi$



12. $t = \frac{\pi}{3}$



16. $t = \frac{5\pi}{3}$



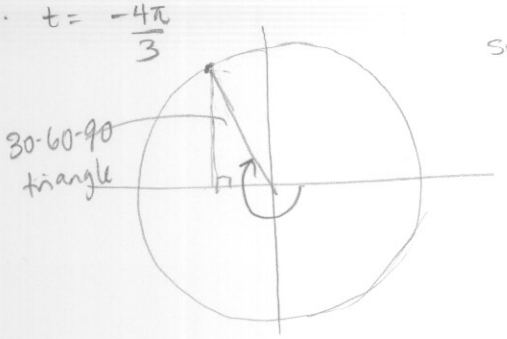
18. $t = \pi/3$ Using #12,

$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$

$\cos\frac{\pi}{3} = \frac{1}{2}$

$\tan\frac{\pi}{3} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$.

22. $t = \frac{-4\pi}{3}$

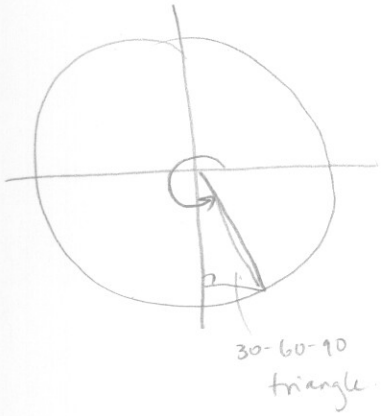


$\sin\left(\frac{-4\pi}{3}\right) = \frac{\sqrt{3}}{2}$

$\cos\left(\frac{-4\pi}{3}\right) = -\frac{1}{2}$

$\tan\left(\frac{-4\pi}{3}\right) = \frac{\sqrt{3}}{2} \cdot \frac{-2}{1} = -\sqrt{3}$

24. $t = \frac{5\pi}{3}$

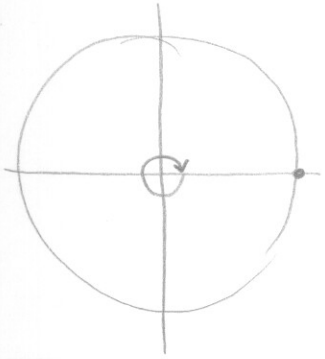


$\sin\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

$\cos\left(\frac{5\pi}{3}\right) = \frac{1}{2}$

$\tan\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{2} \cdot \frac{2}{1} = -\sqrt{3}$

26. $t = -2\pi$



$\sin(-2\pi) = 0$

$\cos(-2\pi) = 1$

$\tan(-2\pi) = \frac{0}{1} = 0.$