WRH12 Solutions

7.1: 1, 8, 13, 19, 25, 30, 45, 54, 58, 63

7.2: 3, 9, 15, 21, 27, 37, 39, 48, 51

7.3: 1, 11, 24, 35, 44, 64, 77, 87, 98, 104, 109

6.4: 20, 41, 48, 63, 79, 89

6.5: 4, 24, 42, 50, 58, 62, 73

7.1

1. $\frac{5\pi}{4} = \frac{5\pi}{4} \cdot \frac{180}{\pi} = \boxed{225^\circ}$

8. $\frac{11\pi}{10} = \frac{11\pi}{10} \cdot \frac{180}{\pi} = \boxed{198^\circ}$

13. $132^\circ = 132 \cdot \frac{\pi}{180} = \frac{66\pi}{90} = \frac{22\pi}{30} = \boxed{\frac{11\pi}{15}}$

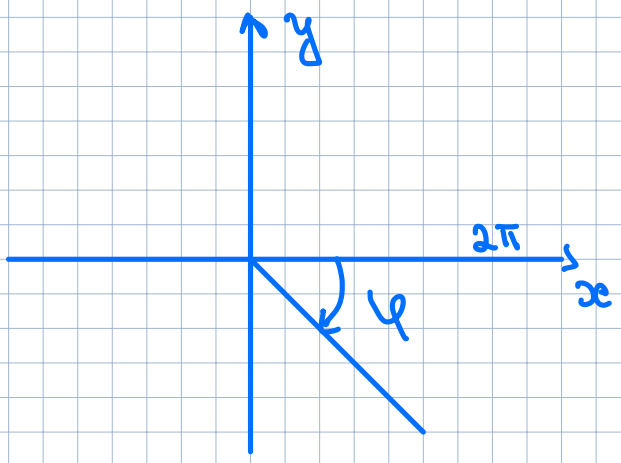
19. $125^\circ = 125 \cdot \frac{\pi}{180} = \boxed{\frac{25\pi}{36}}$

25. $-\frac{2\pi}{5} = -\frac{2\pi}{5} \cdot \frac{180}{\pi} = \boxed{-72^\circ}$

30. $66^\circ = 66 \cdot \frac{\pi}{180} = \frac{22\pi}{60} = \boxed{\frac{11\pi}{30}}$

45. $\boxed{\frac{\pi}{4}}$

54. $\varphi = \frac{7\pi}{4} = 2\pi - \frac{\pi}{4}$



58. $r = 9$ cm

$\theta = \frac{\pi}{2}$

$S = \left(\frac{\theta}{2\pi}\right)(2\pi r) = r\theta$

$S = 9 \cdot \frac{\pi}{2} \approx$ **14.13(cm)**

63. $r = 14$ ft

$S = 63$ ft

$S = r\theta \Rightarrow \theta = \frac{S}{r}$

$\theta = \frac{63}{14} = \frac{9}{2}$

7.2

3. $\sin\theta = \frac{\sqrt{8}}{6\sqrt{2}} = \frac{2\sqrt{2}}{6\sqrt{2}} = \frac{1}{3}$

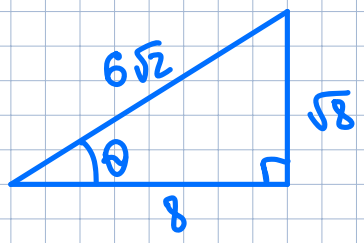
$\cos\theta = \frac{8}{6\sqrt{2}} = \frac{4}{3\sqrt{2}}$

$\tan\theta = \frac{\sqrt{8}}{8} = \frac{1}{\sqrt{8}}$

$\cot\theta = \frac{8}{\sqrt{8}} = \sqrt{8}$

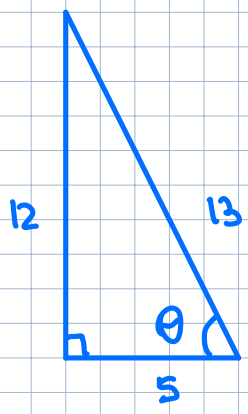
$\sec\theta = \frac{3\sqrt{2}}{4}$

$\csc\theta = 3$



$x = \sqrt{72-64} = \sqrt{8}$

9.



$\sin\theta = \boxed{\frac{12}{13}}$

$\cos\theta = \boxed{\frac{5}{13}}$

$\tan\theta = \boxed{\frac{12}{5}}$

$\cot\theta = \boxed{\frac{5}{12}}$

$\sec\theta = \boxed{\frac{13}{5}}$

$\csc\theta = \boxed{\frac{13}{12}}$

15.

$\sin\left(\frac{\pi}{4}\right) = \boxed{\frac{1}{\sqrt{2}}}$

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

21. $\sec(5°) \approx \boxed{1.0038}$

$\tan(5°) = \boxed{0.0875}$

27. $\sin(84°) = \boxed{0.9945}$

37. $\sec\left(\frac{\pi}{3}\right) = \boxed{2}$

39. $38° 54' 19'' = 38 + \frac{54}{60} + \frac{19}{3600} = 38 + 0.9 + 0.0053 \approx$

$\approx \boxed{38.9053°}$

48. $\tan\theta = 2.5 = \frac{5}{2}$

$\cot\theta - ?$

$\cot\theta = \frac{1}{\tan\theta} = \frac{1}{5/2} = \boxed{\frac{2}{5}}$.

51. $\sin\theta = 0.8 \overset{?}{\Rightarrow} \csc\theta = 1.25$

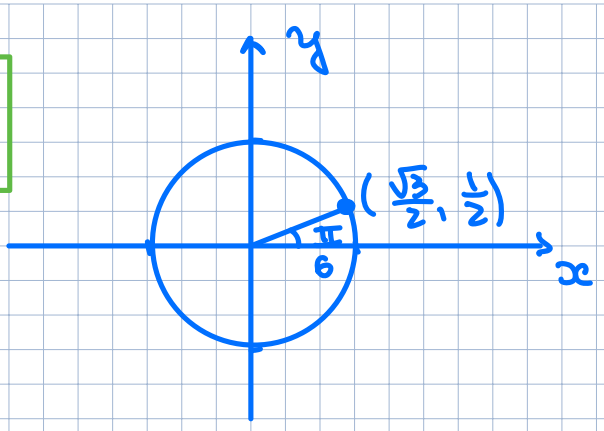
$\csc\theta = \frac{1}{\sin\theta} = \frac{1}{0.8} = 1.25$

$\boxed{\text{True}}$

7.3

1. $S = \frac{\pi}{6}$

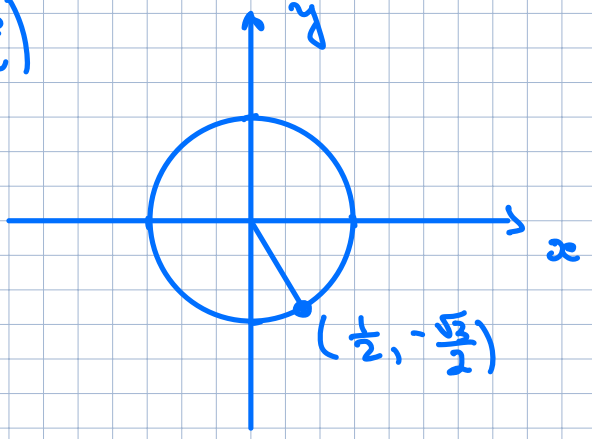
$(x, y) = \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$



11. $(x, y) = \left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

$S = \frac{5\pi}{3} + 2\pi n,$

$n \in \mathbb{Z}$



24. $\theta = \frac{3\pi}{2}$

$\sin\theta = -1$

$\cos\theta = 0$

$\tan\theta$ – DNE

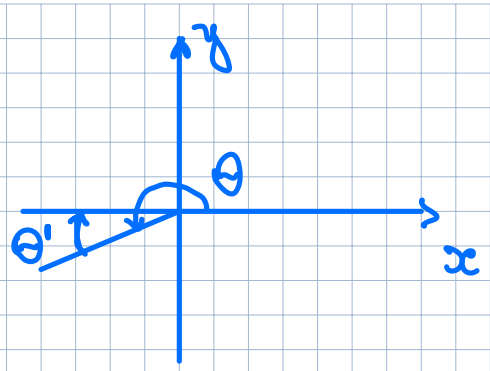
$\cot\theta = 0$

$\sec\theta$ – DNE

$\csc\theta = -1$

35. $\theta = \frac{7\pi}{6}$

$\theta' = \frac{\pi}{6}$



44. $\sin\theta > 0$
$\tan\theta < 0$

Quadrant: II

64. $\cos(-60°) = \cos(60°) = \frac{1}{2}$.

77. $\sin 18° = \cos 72°$

(b)

87. $\cos\left(-\frac{3\pi}{6}\right) = \sin\left(\frac{\pi}{2} + \frac{3\pi}{6}\right) =$

$= \sin\left(\frac{3\pi + 3\pi}{6}\right) = \sin(\pi) = 0$

98.

$\sin\theta = -0.966$
$\cos\theta = -0.259$

$\tan\theta = \frac{\sin\theta}{\cos\theta} = 3.7297$

$\cot\theta = \frac{\cos\theta}{\sin\theta} = 0.2681$

104. $\tan\theta = \frac{\sqrt{3}}{3} = \frac{1}{\sqrt{3}}$

$\sin\theta > 0$

$\theta - ?$ $\sin\theta - ?$

$\theta = \frac{\pi}{6} = 30^\circ$

$\sin\theta = \frac{1}{2}$

109. $\sin\left(\frac{7\pi}{4}\right) = \cos\left(\frac{\pi}{2} - \frac{7\pi}{4}\right) = \cos\left(\frac{-5\pi}{4}\right) =$

$= \cos\left(\frac{5\pi}{4}\right) = -\frac{\sqrt{2}}{2}$, -0.7071

6.4

20. $\log_5 x - 2\log_5 y = \log_5 x - \log_5 y^2 =$

$= \boxed{\log_5\left(\frac{x}{y^2}\right)}$

28. $2\log a^2 b - \log\left(\frac{1}{b}\right) + \log\left(\frac{1}{a}\right) =$

$= \log a^4 b^2 - \log b^{-1} + \log a^{-1} =$

$= \log a^4 b^2 + \log b - \log a = \log\left(\frac{a^4 b^3}{a}\right) =$

$= \boxed{\log\left(a^3 b^3\right)}$

41. $\log_8(2x^2 - 2y) - 0.25\log_8 16 =$

$= \log_8(2x^2 - 2y) - \log_8 \sqrt[4]{16} =$

$= \log_8\left(\frac{2x^2 - 2y}{2}\right) = \boxed{\log_8(x^2 - y)}$

48. $a^{\log_a b + 4\log_a \sqrt{a}} = a^{\log_a b} \cdot a^{4\log_a \sqrt{a}} =$

$= b \cdot a^{4 \cdot \frac{1}{2}} = \boxed{ba^2}$

54. $4^{2\log_2 6 - \log_2 9} = \frac{4^{2\log_2 6}}{4^{\log_2 9}} =$

$= \frac{2^{4\log_2 6}}{2^{2\log_2 9}} = \frac{6^4}{9^2} = 36 \cdot \frac{36}{9 \cdot 9} = 4 \cdot 4 = \boxed{16}$

63. $\log_{\frac{1}{2}} \pi^{-2} = -2 \log_{\frac{1}{2}} \pi = -2 \dfrac{\ln \pi}{\ln \frac{1}{2}} =$

$\approx \boxed{3.303}$

78. $\log_{0.16} 2.8 = \dfrac{\ln 2.8}{\ln 0.16} = \boxed{-0.5618}$

79. $\log_4 16 = \log_4 4^2 = 2 \log_4 4 = \boxed{2}$

89. $\log_x 729 = 9$

$x^9 = 729$

$x = \sqrt[9]{729} \approx \boxed{2.08}$

6.5

4. $8^{3x+2} = 7^{2x+3}$

$\ln 8^{3x+2} = \ln 7^{2x+3}$

$(3x+2)\ln 8 = (2x+3)\ln 7$

$x(3\ln 8 - 2\ln 7) = 3\ln 7 - 2\ln 8$

$\boxed{x = \dfrac{3\ln 7 - 2\ln 8}{3\ln 8 - 2\ln 7}}$

24. $10^{6x} = 3^{3x+4}$

$$\ln 10^{6x} = \ln 3^{3x+4}$$

$$6x \ln 10 = (3x+4)\ln 3$$

$$x(6\ln 10 - 3\ln 3) = 4\ln 3$$

$$\boxed{x = \frac{4\ln 3}{6\ln 10 - 3\ln 3}}$$

30.

$$\ln(15x) - \ln 3 = 6$$

$$\ln\left(\frac{15x}{3}\right) = 6$$

$$\ln(5x) = 6$$

$$5x = e^6$$

$$\boxed{x = \frac{1}{5}e^6}$$

42.

$$\log_2(7x-4) = \log_2(16-3x)$$

$$\log_2 \frac{7x-4}{16-3x} = 0$$

$$\frac{7x-4}{16-3x} = 1$$

$$7x - 4 = 16 - 3x$$

$$10x = 20$$

$$\boxed{x = 2}$$

50.

$$\ln(x+1) + \ln(x-2) = \ln(x+6)$$

$$\ln((x+1)(x-2)) = \ln(x+6)$$

$$x^2 - x - 2 = x + 6$$

$$x^2 - 2x - 8 = 0$$

$$(x-4)(x+2) = 0$$

$$\boxed{x = 4} \qquad \cancel{x = -2}$$

58.

$$e^{2x} - 3e^x - 10 = 0$$

$$e^x = t$$

$$t^2 - 3t - 10 = 0$$

$$(t-5)(t+2) = 0$$

$$t = 5 \quad \text{or} \quad \cancel{t = -2}$$

$$e^x = 5 \quad \text{or} \quad \cancel{e^x = -2}$$

$$\boxed{x = \ln 5}$$

62.

$$f(x) = 0.5 \ln(x^2) = 0.5 \cdot 2 \ln x = \boxed{\ln(x)}$$

68.

$$f(x) = 2\ln(x^3) + \ln(x^6) = 6\ln(x) + 6\ln(x) =$$

$$= \boxed{12\ln(x)} = \ln x^2$$

73.

$$f(x) = 2\ln(5^{\log_4 2}) = 2 \cdot \log_4 2 \cdot \ln 5 =$$

$$= \log_4 4 \cdot \ln 5 = \boxed{\ln 5}.$$