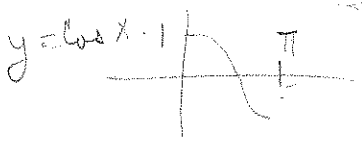
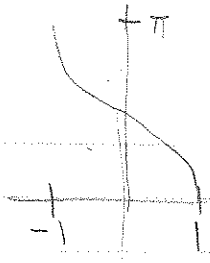


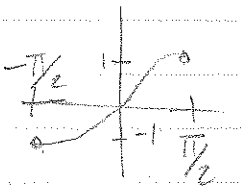
Section 7.5

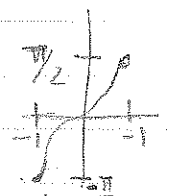


8. $y = \cos^{-1} x = \arccos x$
   a. Domain $(-1, 1)$
   b. Range $(0, \pi)$
   c. decreasing
   d. $\arccos\left(-\frac{1}{2}\right) \neq -\frac{4\pi}{3}$ as $-\frac{4\pi}{3}$ is not in the range

11. $\sec^{-1} a = \cos^{-1} \frac{1}{a}$

14. $y = \sin^{-1}(-1)$
   $-\frac{\pi}{2}$

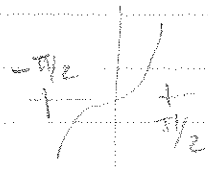


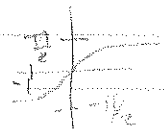


$y = \sin x$ $\quad y = \sin^{-1} x$

16. $y = \arccos 0$
   $\frac{\pi}{2}$

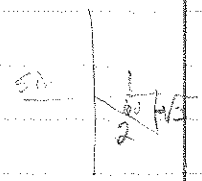
18. $y = \arctan(-1)$
   $-\frac{\pi}{4}$





$y = \tan x$ $\quad y = \tan^{-1} x$

21. $y = \arcsin\left(-\frac{\sqrt{3}}{2}\right)$
   $-\frac{\pi}{3}$



25. $y = \sin^{-1}\sqrt{3}$ does not exist

30. $y = \csc^{-1}\sqrt{2} = \sin^{-1}\frac{1}{\sqrt{2}}$
   $\pi/4$

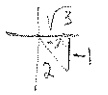
34. $y = \sec^{-1} 0 = \cos^{-1}\frac{1}{0}$ undef. does not exist

36. $y = \operatorname{arccsc}\left(-\frac{1}{2}\right) = \sin^{-1}\left(-\frac{2}{1}\right)$ does not exist

40. $\theta = \arcsin\left(-\frac{\sqrt{2}}{2}\right)$
   $-\frac{\pi}{4}$

43. $\theta = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

$\theta = 120°$



45. $\theta = \csc^{-1}(-2) = \sin^{-1}\left(-\frac{1}{2}\right)$

$\theta = -30$

48. $\theta = \cos^{-1}(-2)$ does not exist

Sect 7.5

Degrees

50) $\theta = \arcsin 0.77900016$

$\theta = 51.16912119°$

54) $\theta = \cot^{-1} 1.7670492$

$\theta = \tan^{-1}(1/1.767)$

$\theta = 29.50618107$

58) $\theta = \sec^{-1}(-5.1180378)$

$\theta = \cos^{-1}(1/-5.1180378)$

$\theta = 101.2673546$

Radians

63. $y = \arctan 1.111111$

$y = 0.83798122$

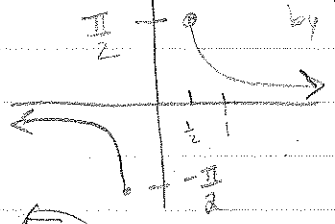
72 $y = \text{arccsc}\, 2x = \csc^{-1}(2x)$

$\csc y = 2x$

$\frac{1}{\sin y} = 2x$

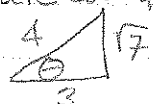
$\sin y = \frac{1}{2x}$

$y = \sin^{-1}\left(\frac{1}{2x}\right)$



x	y
$\frac{1}{2}$	$\frac{\pi}{2}$ 1.57
1	$\frac{\pi}{6}$ = 0.52
2	0.25
4	0.125

79. $\tan(\arccos\frac{3}{4}) = \frac{\sqrt{7}}{3}$

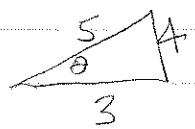


80. $\sin(\text{arccot}\frac{1}{4}) = \frac{\sqrt{15}}{4}$

85. $\cos(2\arctan\frac{4}{3}) = \cos(2\theta) = 1 - 2\sin^2\theta$

$= 1 - 2\left(\frac{4}{5}\right)^2$

$= \frac{25}{25} - \frac{32}{25} = -\frac{7}{25}$



92. $\cos\left(\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{5}{13}\right)$

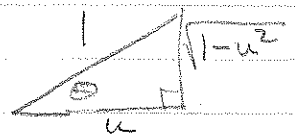
$\cos(A+B)$

$\cos A \cos B - \sin A \sin B$

$\frac{4}{5}\cdot\frac{5}{13} - \frac{3}{5}\cdot\frac{12}{13}$

$\frac{20}{65} - \frac{36}{65} = \frac{-16}{65}$

100. $\tan(\arccos u)$



$\tan\theta = \frac{\sqrt{1-u^2}}{u}$

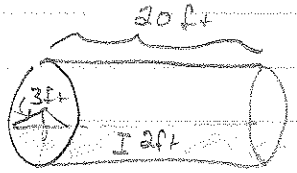
114.

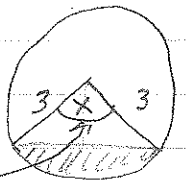
$\cos\theta = \frac{1}{3}$

$\cos^{-1}(\cos\theta) = \cos^{-1}\frac{1}{3}$

$\theta = 70.53°$

$x = 2\theta = 141.06°$





$V = \frac{141.06}{360}\cdot\pi r^2\cdot 20 - 2\left(\frac{1}{2}\sqrt{8}\cdot 1\right)\cdot 20$

$221.57 - 56.57 = 165\ ft^3$

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12. $\sin x + 2 = 3$
$-2 \quad -2$
$\sin x = 1$

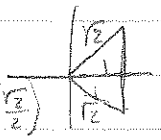
$x = \frac{\pi}{2}$

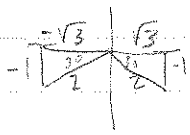
18. $(\csc x + 2)(\csc x - \sqrt{2}) = 0$

$\csc x + 2 = 0$, $\csc x - \sqrt{2} = 0$

$\csc x = -2$ $\qquad$ $\csc x = \sqrt{2}$

$\frac{1}{\sin x} = -2$ $\qquad$ $\frac{1}{\cos x} = \sqrt{2}$





$\sin x = -\frac{1}{2} \Rightarrow x = \sin^{-1}\left(\frac{1}{2}\right)$, $\cos x = \frac{1}{\sqrt{2}} \rightarrow x = \cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$

$\left\{\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{4}, \frac{7\pi}{4}\right\}$

22. $2\cos^2 x - \cos x = 1$

$2\cos^2 x - \cos x - 1 = 0$

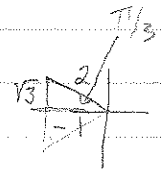
$(2\cos x + 1)(\cos x - 1) = 0$

$2\cos x + 1 = 0$, $\cos x - 1 = 0$

$\frac{2\cos x}{2} = \frac{-1}{2}$, $\cos x = 1$

$\cos x = -\frac{1}{2}$ $\qquad$ $x = \cos^{-1}(1)$

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



$\left\{0, \frac{2\pi}{3}, \frac{4\pi}{3}\right\}$

27. $\tan\theta - \cot\theta = 0$, in the interval $[0, 360^\circ)$

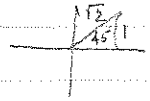
$\left(\frac{\sin\theta}{\sin\theta}\right)\frac{\sin\theta}{\cos\theta} - \frac{\cos\theta}{\sin\theta}\left(\frac{\cos\theta}{\cos\theta}\right) \Rightarrow \frac{\sin^2\theta - \cos^2\theta}{\sin\theta\cos\theta} = 0$

$\sin^2\theta - \cos^2\theta = 0$, $\cos^2 A - \sin^2 A = \cos 2A$

$-\cos 2\theta = 0$, $\cos 2A = 1 - 2\sin^2 A$

$2\sin^2\theta - 1 = 0$

$\sqrt{\sin^2\theta = \pm\frac{1}{2}} \Rightarrow \sin\theta = \pm\frac{1}{\sqrt{2}}\frac{\sqrt{2}}{\sqrt{2}} = \frac{\pm\sqrt{2}}{2}$



$\{45^\circ, 135^\circ, 225^\circ, 315^\circ\}$

30. $\frac{\sin^2\theta \cos\theta}{\cos\theta} = \frac{\cos\theta}{\cos\theta}$

$\sqrt{\sin^2\theta} = \pm\sqrt{1}$

$\sin\theta = \pm\sqrt{1}$

$\{90°, 270°\}$

34. $\cos^2\theta - \sin^2\theta = 0$

$(\cos\theta - \sin\theta)(\cos\theta + \sin\theta) = 0$ or $\cos 2\theta = 0$

$\cos\theta = \sin\theta$, $\cos\theta = -\sin\theta$ $\cos^{-1}(\cos 2\theta) = \cos^{-1} 0$

$\theta = \{45°, 135°, 225, 315°\}$ $\frac{2\theta}{2} = \frac{\cos^{-1} 0}{2}$

39. $\sin^2\theta - 2\sin\theta + 3 = 0$ $\theta = \frac{1}{2}\cos^{-1} 0$

Let $x = \sin\theta$

$x^2 - 2x + 3 = 0$

$x = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(3)}}{2(1)} = \frac{2 \pm \sqrt{4-12}}{2} = \frac{2 \pm \sqrt{-8}}{2}$

No solution

44. $\tan\theta + 1 = 0$, θ is in degrees

$\tan\theta = -1$

$\theta = \tan^{-1}(-1)$

$\{135° + 180n$, where n is any integer$\}$

49. $2\cos^2 x + \cos x - 1 = 0$

$(2\cos x - 1)(\cos x + 1) = 0$

$2\cos x - 1 = 0$, $\cos x + 1 = 0$

$\cos x = \frac{1}{2}$ $\cos x = -1$

$x = \cos^{-1}\left(\frac{1}{2}\right)$, $x = \cos^{-1}(-1)$

$\{\frac{\pi}{3} + 2\pi n, \frac{5\pi}{3} + 2\pi n$ & $\pi + 2\pi n$ where n is any integer$\}$

54. $\tan x(\tan x - 2) = 5$

$\tan^2 x - 2\tan x - 5 = 0$

Let $y = \tan x$ so $y^2 - 2y - 5 = 0$

$y = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(-5)}}{2(1)} = \frac{2 \pm \sqrt{4+20}}{2} = \frac{2 \pm \sqrt{24}}{2}$

Sect 7.6 continued

#54) $x = \frac{2 + \sqrt{24}}{2} \approx 3.4494897$

$x = \frac{2 - \sqrt{24}}{2} \approx -1.4494897$

$3.4494897 = \tan x$, $-1.4494897 = \tan x$

So $x = \tan^{-1} 3.4494897$

$x = 1.2886$ $\quad x = -0.96688$

$+\pi$

2.1747

$\{1.2886 + 2\pi n, 2.1747 + 2\pi n$ where n is any integer