Workshop Solutions to Sections 2.3 and 2.4

1) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $(f+g)(x) =$ Solution: $$(f+g)(x) = x^2 + \sqrt{4-x}$$	2) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $D_{f+g} =$ Solution: $D_f = \mathbb{R}$ $g(x)$ is defined when $4-x \geq 0 \iff x \leq 4$. Thus, $D_g = (-\infty, 4]$ $D_{f+g} = D_f \cap D_g = \mathbb{R} \cap (-\infty, 4] = (-\infty, 4]$
3) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $(f-g)(x) =$ Solution: $$(f-g)(x) = x^2 - \sqrt{4-x}$$	4) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $D_{f-g} =$ Solution: $D_f = \mathbb{R}$ $g(x)$ is defined when $4-x \geq 0 \iff x \leq 4$. Thus, $D_g = (-\infty, 4]$ $D_{f-g} = D_f \cap D_g = \mathbb{R} \cap (-\infty, 4] = (-\infty, 4]$
5) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $(fg)(x) =$ Solution: $$(fg)(x) = x^2\sqrt{4-x}$$	6) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $D_{fg} =$ Solution: $D_f = \mathbb{R}$ $g(x)$ is defined when $4-x \geq 0 \iff x \leq 4$. Thus, $D_g = (-\infty, 4]$ $D_{fg} = D_f \cap D_g = \mathbb{R} \cap (-\infty, 4] = (-\infty, 4]$
7) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $(f \circ g)(x) =$ Solution: $(f \circ g)(x) = f\big(g(x)\big)$ $= f\big(\sqrt{4-x}\big) = \big(\sqrt{4-x}\big)^2 = 4-x$	8) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $D_{f \circ g} =$ Solution: $(f \circ g)(x) = f\big(g(x)\big)$ $= f\big(\sqrt{4-x}\big) = \big(\sqrt{4-x}\big)^2 = 4-x$ $D_g = (-\infty, 4]$ $D_{f(g(x))} = \mathbb{R}$ $D_{f \circ g} = D_g \cap D_{f(g(x))} = (-\infty, 4] \cap \mathbb{R} = (-\infty, 4]$
9) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $(g \circ f)(x) =$ Solution: $(g \circ f)(x) = g\big(f(x)\big) = g(x^2) = \sqrt{4-x^2}$	10) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $D_{g \circ f} =$ Solution: $(g \circ f)(x) = g\big(f(x)\big) = g(x^2) = \sqrt{4-x^2}$ $D_f = \mathbb{R}$ $D_{g(f(x))} = [-2,2]$ $D_{g \circ f} = D_f \cap D_{g(f(x))} = \mathbb{R} \cap [-2,2] = [-2,2]$
11) If $f(x) = x^2$, then $(f \circ f)(x) =$ Solution: $(f \circ f)(x) = f\big(f(x)\big) = f(x^2) = (x^2)^2 = x^4$	12) If $f(x) = x^2$, then $D_{f \circ f} =$ Solution: $(f \circ f)(x) = f\big(f(x)\big) = f(x^2) = (x^2)^2 = x^4$ $D_f = \mathbb{R}$ $D_{f(f(x))} = \mathbb{R}$ $D_{f \circ f} = D_f \cap D_{f(f(x))} = \mathbb{R} \cap \mathbb{R} = \mathbb{R}$
13) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $\left(\frac{f}{g}\right)(x) =$ Solution: $$\left(\frac{f}{g}\right)(x) = \frac{x^2}{\sqrt{4-x}}$$	14) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $D_{\frac{f}{g}} =$ Solution: $$\left(\frac{f}{g}\right)(x) = \frac{x^2}{\sqrt{4-x}}$$ $D_f = \mathbb{R}$ $g(x)$ is defined when $4-x \geq 0 \iff x \leq 4$. Thus, $D_g = (-\infty, 4]$ $D_{\frac{f}{g}} = \{x \in D_f \cap D_g \mid g(x) \neq 0\}$ $= \mathbb{R} \cap (-\infty, 4) = (-\infty, 4)$

15) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $\left(\frac{g}{f}\right)(x) =$

Solution:

$$\left(\frac{g}{f}\right)(x) = \frac{\sqrt{4-x}}{x^2}$$

16) If $f(x) = x^2$ and $g(x) = \sqrt{4-x}$, then $D_{\frac{g}{f}} =$

Solution:

$$\left(\frac{g}{f}\right)(x) = \frac{\sqrt{4-x}}{x^2}$$

$D_f = \mathbb{R}$

$g(x)$ is defined when $4 - x \geq 0 \quad \Leftrightarrow \quad x \leq 4$. Thus,

$D_g = (-\infty, 4]$

$$\begin{aligned} D_{\frac{g}{f}} &= \left\{x \in D_f \cap D_g \middle| f(x) \neq 0\right\} \\ &= \mathbb{R} \setminus \{0\} \cap (-\infty, 4] = (-\infty, 0) \cup (0,4] \end{aligned}$$

17) If $f(x) = 9 - x^2$ and $g(x) = 10$, then $(f+g)(x) =$

Solution:

$$\begin{aligned} (f+g)(x) &= (9 - x^2) + (10) = 9 - x^2 + 10 \\ &= 19 - x^2 \end{aligned}$$

18) If $f(x) = 9 - x^2$ and $g(x) = 10$, then $(f-g)(x) =$

Solution:

$$\begin{aligned} (f-g)(x) &= (9 - x^2) - (10) = 9 - x^2 - 10 \\ &= -x^2 - 1 \end{aligned}$$

19) If $f(x) = 9 - x^2$ and $g(x) = 10$, then $(g-f)(x) =$

Solution:

$$\begin{aligned} (g-f)(x) &= (10) - (9 - x^2) = 10 - 9 + x^2 \\ &= 1 + x^2 \end{aligned}$$

20) If $f(x) = 9 - x^2$ and $g(x) = 10$, then $(fg)(x) =$

Solution:

$$(fg)(x) = (9 - x^2)(10) = 90 - 10x^2$$

21) If $f(x) = 9 - x^2$ and $g(x) = 10$, then $(f \circ g)(x) =$

Solution:

$$\begin{aligned} (f \circ g)(x) &= f(g(x)) = f(10) \\ &= 9 - 10^2 = 9 - 100 = -91 \end{aligned}$$

22) If $f(x) = 9 - x^2$ and $g(x) = 10$, then $(g \circ f)(x) =$

Solution:

$(g \circ f)(x) = g(f(x)) = g(9 - x^2) = 10$

23) If $f(x) = 9 - x^2$ and $g(x) = 10$, then $(f \circ f)(x) =$

Solution:

$$\begin{aligned} (f \circ f)(x) &= f(f(x)) = f(9 - x^2) \\ &= 9 - (9 - x^2)^2 \end{aligned}$$

24) If $f(x) = 9 - x^2$ and $g(x) = 10$, then $(g \circ g)(x) =$

Solution:

$$(g \circ g)(x) = g(g(x)) = g(10) = 10$$

25) If $f(x) = 9 - x^2$, $g(x) = \sin x$ and $h(x) = 3x + 2$, then $(f \circ g \circ h)(x) =$

Solution:

$$\begin{aligned} (f \circ g \circ h)(x) &= f\left(g\big(h(x)\big)\right) \\ &= f\big(g(3x+2)\big) \\ &= f(\sin(3x+2)) \\ &= 9 - (\sin(3x+2))^2 \\ &= 9 - sin^2(3x+2) \end{aligned}$$

26) If $f(x) = \sqrt{25 + x^2}$ and $g(x) = x^3$, then $(f+g)(x) =$

Solution:

$$(f+g)(x) = \sqrt{25 + x^2} + x^3$$

27) If $f(x) = \sqrt{25 + x^2}$ and $g(x) = x^3$, then $(f-g)(x) =$

Solution:

$$(f-g)(x) = \sqrt{25 + x^2} - x^3$$

28) If $f(x) = \sqrt{25 + x^2}$ and $g(x) = x^3$, then $(fg)(x) =$

Solution:

$$(fg)(x) = x^3\sqrt{25 + x^2}$$

29) If $f(x) = \sqrt{25 + x^2}$ and $g(x) = x^3$, then $\left(\frac{f}{g}\right)(x) =$

Solution:

$$\left(\frac{f}{g}\right)(x) = \frac{\sqrt{25 + x^2}}{x^3}$$

30) If $f(x) = \sqrt{25 + x^2}$ and $g(x) = x^3$, then $(f \circ g)(x) =$

Solution:

$$\begin{aligned} (f \circ g)(x) &= f(g(x)) = f(x^3) = \sqrt{25 + (x^3)^2} \\ &= \sqrt{25 + x^6} \end{aligned}$$

31) If $f(x) = \sqrt{25 + x^2}$ and $g(x) = x^3$, then $(g \circ f)(x) =$

Solution:

$$\begin{aligned} (g \circ f)(x) &= g\big(f(x)\big) = g\left(\sqrt{25 + x^2}\right) \\ &= \left(\sqrt{25 + x^2}\right)^3 \\ &= \sqrt{(25 + x^2)^3} \end{aligned}$$

32) If $f(x) = \sqrt{x}$ and $g(x) = x - 2$, then $(f \circ g)(x) =$

Solution:

$$(f \circ g)(x) = f(g(x)) = f(x - 2) = \sqrt{x - 2}$$

33) If $f(x)=\sqrt{x}$ and $g(x)=x-2$, then $(g\circ f)(x)=$ Solution: $(g\circ f)(x)=g(f(x))=g(\sqrt{x})=\sqrt{x}-2$	34) If $f(x)=\sqrt{x}$ and $g(x)=x-2$, then $(g\circ g)(x)=$ Solution: $(g\circ g)(x)=g(g(x))=g(x-2)=(x-2)-2$ $=x-2-2=x-4$
35) If $f(x)=\sqrt{x}$ and $g(x)=x-2$, then $(fg)(x)=$ Solution: $(fg)(x)=(\sqrt{x})(x-2)=(x-2)\sqrt{x}$	36) If $f(x)=\sin 5x$ and $g(x)=x^2+3$, then $(f\circ g)(x)=$ Solution: $(f\circ g)(x)=f(g(x))=f(x^2+3)=\sin 5(x^2+3)$
37) If $f(x)=\sin 5x$ and $g(x)=x^2+3$, then $(g\circ f)(x)=$ Solution: $(g\circ f)(x)=g(f(x))=g(\sin 5x)=(\sin 5x)^2+3$ $=sin^2 5x+3$	38) If $f(x)=\sin 5x$ and $g(x)=x^2+3$, then $(fg)(x)=$ Solution: $(fg)(x)=(\sin 5x)(x^2+3)=(x^2+3)\sin 5x$
39) If $f(x)=\sqrt{x}$ and $g(x)=\cos x$, then $(g\circ f)(x)=$ Solution: $(g\circ f)(x)=g(f(x))=g(\sqrt{x})=\cos\sqrt{x}$	40) If $f(x)=x+\frac{1}{x}$ and $g(x)=1-x^2$, then $(f\circ g)(x)=$ Solution: $(f\circ g)(x)=f(g(x))=f(1-x^2)=(1-x^2)+\dfrac{1}{1-x^2}$
41) If $f(x)=x+\frac{1}{x}$ and $g(x)=1-x^2$, then $(g\circ f)(x)=$ Solution: $(g\circ f)(x)=g(f(x))=g\left(x+\dfrac{1}{x}\right)=1-\left(x+\dfrac{1}{x}\right)^2$	42) If $f(x)=x+\frac{1}{x}$ and $g(x)=1-x^2$, then $(fg)(x)=$ Solution: $(fg)(x)=\left(x+\dfrac{1}{x}\right)(1-x^2)$
43) If the graph of the function $f(x)=x^2$ is shifted a distance 2 units upwards , then the new graph represented the graph of the function is Solution: x^2+2	44) If the graph of the function $f(x)=x^2$ is shifted a distance 2 units downwards , then the new graph represented the graph of the function is Solution: x^2-2
45) If the graph of the function $f(x)=x^2$ is shifted a distance 2 units to the right , then the new graph represented the graph of the function is Solution: $(x-2)^2=x^2-4x+4$	46) If the graph of the function $f(x)=x^2$ is shifted a distance 2 units to the left , then the new graph represented the graph of the function is Solution: $(x+2)^2=x^2+4x+4$
47) If the graph of the function $f(x)=\cos x$ is stretched vertically by a factor of 2 , then the new graph represented the graph of the function is Solution: $2\cos x$	48) If the graph of the function $f(x)=\cos x$ is compressed vertically by a factor of $\frac{1}{2}$, then the new graph represented the graph of the function is Solution: $\dfrac{1}{2}\cos x$
49) If the graph of the function $f(x)=\cos x$ is compressed horizontally by a factor of 2 , then the new graph represented the graph of the function is Solution: $\cos 2x$	50) If the graph of the function $f(x)=\cos x$ is stretched horizontally by a factor of $\frac{1}{2}$, then the new graph represented the graph of the function is Solution: $\cos\dfrac{x}{2}$
51) The graph of the function $f(x)=\sqrt{x}$ is reflected about the $x-axis$ if Solution: $f(x)=-\sqrt{x}$	52) The graph of the function $f(x)=\sqrt{x}$ is reflected about the $y-axis$ if Solution: $f(x)=\sqrt{-x}$
53) If the graph of the function $f(x)=e^x$ is shifted a distance 2 units upwards , then the new graph represented the graph of the function is Solution: e^x+2	54) If the graph of the function $f(x)=e^x$ is shifted a distance 2 units downwards , then the new graph represented the graph of the function is Solution: e^x-2

55) If the graph of the function $f(x) = e^x$ is shifted a distance 2 units to the right , then the new graph represented the graph of the function is
Solution:

$$e^{x-2}$$

56) If the graph of the function $f(x) = e^x$ is shifted a distance 2 units to the left , then the new graph represented the graph of the function is
Solution:

$$e^{x+2}$$

57) $\frac{2\pi}{3}$ rad $= \frac{2\pi}{3} \times \frac{180^\circ}{\pi} = 120^\circ$

58) $\frac{5\pi}{6}$ rad $= \frac{5\pi}{6} \times \frac{180^\circ}{\pi} = 150^\circ$

59) $\frac{7\pi}{6}$ rad $= \frac{7\pi}{6} \times \frac{180^\circ}{\pi} = 210^\circ$

60) $\frac{3\pi}{2}$ rad $= \frac{3\pi}{2} \times \frac{180^\circ}{\pi} = 270^\circ$

61) $120^\circ = 120 \times \frac{\pi}{180^\circ} = \frac{2\pi}{3}$ rad

62) $270^\circ = 270 \times \frac{\pi}{180^\circ} = \frac{3\pi}{2}$ rad

63) $\frac{5\pi}{12}$ rad $= \frac{5\pi}{12} \times \frac{180^\circ}{\pi} = 75^\circ$

64) $\frac{3\pi}{4}$ rad $= \frac{3\pi}{4} \times \frac{180^\circ}{\pi} = 135^\circ$

65) $150^\circ = 150 \times \frac{\pi}{180^\circ} = \frac{5\pi}{6}$ rad

66) $210^\circ = 210 \times \frac{\pi}{180^\circ} = \frac{7\pi}{6}$ rad

67) $\frac{1}{\sec x} = \cos x$

68) $\frac{1}{\csc x} = \sin x$

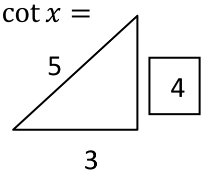
69) $\frac{1}{\cot x} = \tan x$

70) $\frac{\sin x}{\cos x} = \tan x$

71) $\frac{\cos x}{\sin x} = \cot x$

72) If $\cos x = \frac{3}{5}$ and $0 < x < \frac{\pi}{2}$, then $\cot x =$
Solution:

$$\cos x = \frac{3}{5} = \frac{adj}{hyp}$$



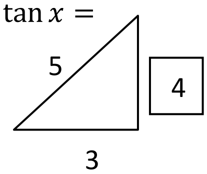
Now, we should find the length of the opposite side using the Pythagorean Theorem, so

$|\text{opposite}| = \sqrt{5^2 - 3^2} = \sqrt{25-9} = \sqrt{16} = 4$

$$\therefore \ \cot x = \frac{1}{\tan x} = \frac{adj}{opp} = \frac{3}{4}$$

73) If $\cos x = \frac{3}{5}$ and $0 < x < \frac{\pi}{2}$, then $\tan x =$
Solution:

$$\cos x = \frac{3}{5} = \frac{adj}{hyp}$$



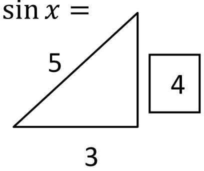
Now, we should find the length of the opposite side using the Pythagorean Theorem, so

$|\text{opposite}| = \sqrt{5^2 - 3^2} = \sqrt{25-9} = \sqrt{16} = 4$

$$\therefore \ \tan x = \frac{1}{\cot x} = \frac{opp}{adj} = \frac{4}{3}$$

74) If $\cos x = \frac{3}{5}$ and $0 < x < \frac{\pi}{2}$, then $\sin x =$
Solution:

$$\cos x = \frac{3}{5} = \frac{adj}{hyp}$$



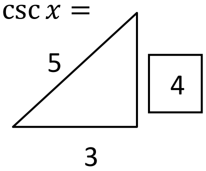
Now, we should find the length of the opposite side using the Pythagorean Theorem, so

$|\text{opposite}| = \sqrt{5^2 - 3^2} = \sqrt{25-9} = \sqrt{16} = 4$

$$\therefore \ \sin x = \frac{opp}{hyp} = \frac{4}{5}$$

75) If $\cos x = \frac{3}{5}$ and $0 < x < \frac{\pi}{2}$, then $\csc x =$
Solution:

$$\cos x = \frac{3}{5} = \frac{adj}{hyp}$$



Now, we should find the length of the opposite side using the Pythagorean Theorem, so

$|\text{opposite}| = \sqrt{5^2 - 3^2} = \sqrt{25-9} = \sqrt{16} = 4$

$$\therefore \ \csc x = \frac{1}{\sin x} = \frac{hyp}{opp} = \frac{5}{4}$$

76) $\sin\left(\frac{5\pi}{6}\right) =$
Solution:

$\frac{5\pi}{6}$ rad $= \frac{5\pi}{6} \times \frac{180^\circ}{\pi} = 150^\circ$

So, we deduce now that $\sin\left(\frac{5\pi}{6}\right)$ is in the second quarter.

$$\sin\left(\frac{5\pi}{6}\right) = \sin(150^\circ) = \sin(180^\circ - 30^\circ) = \sin(30^\circ)$$
$$= \sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$$

77) $\cos\left(\frac{5\pi}{6}\right) =$
Solution:

$\frac{5\pi}{6}$ rad $= \frac{5\pi}{6} \times \frac{180^\circ}{\pi} = 150^\circ$

So, we deduce now that $\cos\left(\frac{5\pi}{6}\right)$ is in the second quarter.

$$\cos\left(\frac{5\pi}{6}\right) = \cos(150^\circ) = \cos(180^\circ - 30^\circ)$$
$$= -\cos(30^\circ) = -\cos\left(\frac{\pi}{6}\right) = -\frac{\sqrt{3}}{2}$$

78) $\tan\left(\frac{5\pi}{6}\right) =$
Solution:

$\frac{5\pi}{6}$ rad $= \frac{5\pi}{6} \times \frac{180^\circ}{\pi} = 150^\circ$

So, we deduce now that $\tan\left(\frac{5\pi}{6}\right)$ is in the second

79) $\cot\left(\frac{5\pi}{6}\right) =$
Solution:

$\frac{5\pi}{6}$ rad $= \frac{5\pi}{6} \times \frac{180^\circ}{\pi} = 150^\circ$

So, we deduce now that $\cot\left(\frac{5\pi}{6}\right)$ is in the second quarter.

quarter.

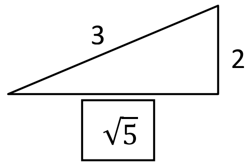
$$\tan\left(\frac{5\pi}{6}\right)=\tan(150^{\circ})=\tan(180^{\circ}-30^{\circ})$$
$$=-\tan(30^{\circ})=-\tan\left(\frac{\pi}{6}\right)=-\frac{1}{\sqrt{3}}$$

$$\cot\left(\frac{5\pi}{6}\right)=\cot(150^{\circ})=\cot(180^{\circ}-30^{\circ})$$
$$=-\cot(30^{\circ})=-\cot\left(\frac{\pi}{6}\right)=-\sqrt{3}$$

80) If $\sin x=\frac{2}{3}$ and $0<x<\frac{\pi}{2}$, then $\sec x=$

Solution:

$$\sin x=\frac{2}{3}=\frac{opp}{hyp}$$



Now, we should find the length of the adjacent side using the Pythagorean Theorem, so

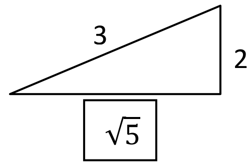
$|\text{adjacent}|=\sqrt{3^2-2^2}=\sqrt{9-4}=\sqrt{5}$

$$\therefore\ \sec x=\frac{1}{\cos x}=\frac{hyp}{adj}=\frac{3}{\sqrt{5}}$$

81) If $\sin x=\frac{2}{3}$ and $0<x<\frac{\pi}{2}$, then $\csc x=$

Solution:

$$\sin x=\frac{2}{3}=\frac{opp}{hyp}$$



Now, we should find the length of the adjacent side using the Pythagorean Theorem, so

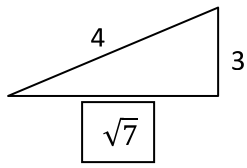
$|\text{adjacent}|=\sqrt{3^2-2^2}=\sqrt{9-4}=\sqrt{5}$

$$\therefore\ \csc x=\frac{1}{\sin x}=\frac{hyp}{opp}=\frac{3}{2}$$

82) If $\sin x=\frac{3}{4}$ and $0<x<\frac{\pi}{2}$, then $\cos x=$

Solution:

$$\sin x=\frac{3}{4}=\frac{opp}{hyp}$$



Now, we should find the length of the adjacent side using the Pythagorean Theorem, so

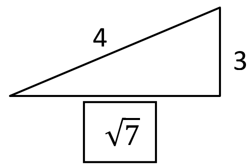
$|\text{adjacent}|=\sqrt{4^2-3^2}=\sqrt{16-9}=\sqrt{7}$

$$\therefore\ \cos x=\frac{adj}{hyp}=\frac{\sqrt{7}}{4}$$

83) If $\sin x=\frac{3}{4}$ and $0<x<\frac{\pi}{2}$, then $\cot x=$

Solution:

$$\sin x=\frac{3}{4}=\frac{opp}{hyp}$$



Now, we should find the length of the adjacent side using the Pythagorean Theorem, so

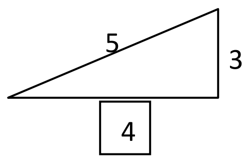
$|\text{adjacent}|=\sqrt{4^2-3^2}=\sqrt{16-9}=\sqrt{7}$

$$\therefore\ \cot x=\frac{1}{\tan x}=\frac{adj}{opp}=\frac{\sqrt{7}}{3}$$

84) If $\csc x=-\frac{5}{3}$ and $\frac{3\pi}{2}<x<2\pi$, then $\cos x=$

Solution:

$$\csc x=\frac{5}{3}=\frac{1}{\sin x}=\frac{hyp}{opp}$$



Now, we should find the length of the adjacent side using the Pythagorean Theorem, so

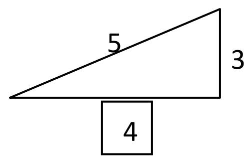
$|\text{adjacent}|=\sqrt{5^2-3^2}=\sqrt{25-9}=\sqrt{16}=4$

$$\therefore\ \cos x=\frac{adj}{hyp}=\frac{4}{5}$$

85) If $\csc x=-\frac{5}{3}$ and $\frac{3\pi}{2}<x<2\pi$, then $\sec x=$

Solution:

$$\csc x=\frac{5}{3}=\frac{1}{\sin x}=\frac{hyp}{opp}$$



Now, we should find the length of the adjacent side using the Pythagorean Theorem, so

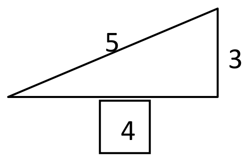
$|\text{adjacent}|=\sqrt{5^2-3^2}=\sqrt{25-9}=\sqrt{16}=4$

$$\therefore\ \sec x=\frac{1}{\cos x}=\frac{hyp}{adj}=\frac{5}{4}$$

86) If $\csc x=-\frac{5}{3}$ and $\frac{3\pi}{2}<x<2\pi$, then $\cot x=$

Solution:

$$\csc x=\frac{5}{3}=\frac{1}{\sin x}=\frac{hyp}{opp}$$



Now, we should find the length of the adjacent side using the Pythagorean Theorem, so

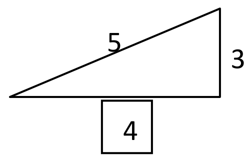
$|\text{adjacent}|=\sqrt{5^2-3^2}=\sqrt{25-9}=\sqrt{16}=4$

$$\therefore\ \cot x=\frac{1}{\tan x}=\frac{adj}{opp}=-\frac{4}{3}$$

87) If $\csc x=-\frac{5}{3}$ and $\frac{3\pi}{2}<x<2\pi$, then $\tan x=$

Solution:

$$\csc x=\frac{5}{3}=\frac{1}{\sin x}=\frac{hyp}{opp}$$



Now, we should find the length of the adjacent side using the Pythagorean Theorem, so

$|\text{adjacent}|=\sqrt{5^2-3^2}=\sqrt{25-9}=\sqrt{16}=4$

$$\therefore\ \tan x=\frac{1}{\cot x}=\frac{opp}{adj}=-\frac{3}{4}$$

88) If $f(x)=\sin x$, then $D_f=\mathbb{R}$

89) If $f(x)=\cos x$, then $D_f=\mathbb{R}$

90) If $f(x)=\sin x$, then $R_f=[-1,1]$

91) If $f(x)=\cos x$, then $R_f=[-1,1]$