28. $\tan(x-y)$ if $\sin x = \frac{8}{17}$ and $\cos y = \frac{3}{5}$

$$= \frac{\tan x - \tan y}{1 + \tan x \tan y}$$

$$= \frac{\frac{8}{15} - \frac{4}{3}}{\frac{45}{45} + \left(\frac{8}{15}\right)\left(\frac{4}{3}\right)} \quad \frac{20}{15} \quad \frac{32}{45}$$

$$= \frac{-\frac{12}{15}}{\frac{77}{45}} = -\frac{12}{15} \cdot \frac{45}{77} = -\frac{36}{77}$$

$$1 + \cot^2 x = \left(\frac{17}{8}\right)^2 - 1$$

$$-1$$

$$\cot^2 x = \frac{225}{64}$$

$$\cot x = \frac{15}{8}$$

$$\tan x = \frac{8}{15}$$

$$\tan^2 y + 1 = \left(\frac{5}{3}\right)^2 - 1$$

$$-1$$

$$\tan^2 y = \frac{16}{9}$$

$$\tan y = \frac{4}{3}$$

29. $\cos(x+y)$ if $\tan x = \frac{5}{3}$ and $\sin y = \frac{1}{3}$

$$= \cos x \cos y - \sin x \sin y$$

$$= \left(\frac{3\sqrt{34}}{34}\right)\left(\frac{2\sqrt{2}}{3}\right) - \left(\frac{5\sqrt{34}}{34}\right)\left(\frac{1}{3}\right)$$

$$= \frac{6\sqrt{68} - 5\sqrt{34}}{102} \quad \sqrt{4}\sqrt{17}$$

$$= \frac{12\sqrt{17} - 5\sqrt{34}}{102}$$

$$\left(\frac{1}{3}\right)^2 + \cos^2 y = 1$$

$$\cos^2 y = \frac{8}{9}$$

$$\cos y = \frac{2\sqrt{2}}{3}$$

$$\left(\frac{5}{3}\right)^2 + 1 = \sec^2 x$$

$$\frac{34}{9} = \sec^2 x$$

$$\frac{\sqrt{34}}{3} = \sec x$$

$$\cos x = \frac{3}{\sqrt{34}} = \frac{3\sqrt{34}}{34}$$

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

$$\tan\theta \cos\theta = \sin\theta$$

$$\left(\frac{3\sqrt{34}}{34}\right)\frac{5}{3} = \frac{\sin x}{\frac{3\sqrt{34}}{34}} \left(\frac{3\sqrt{34}}{34}\right)$$

$$\frac{5\sqrt{34}}{34} = \sin x$$

16. $\cos \frac{7\pi}{12} = \cos 105^\circ.$

$$\cos(60+45) = \cos 60 \cos 45 - \sin 60 \sin 45$$
$$= \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$$
$$= \frac{\sqrt{2} - \sqrt{6}}{4}$$

$\tan 45 = 1$

38. $\tan(x + 45^\circ) = \dfrac{1 + \tan x}{1 - \tan x}$

$$\frac{\tan x + \tan 45}{1 - \tan x \tan 45} =$$
$$\frac{\tan x + 1}{1 - \tan x (1)} =$$
$$\frac{1 + \tan x}{1 - \tan x} = \frac{1 + \tan x}{1 - \tan x}$$

20. $\tan 165° = \tan(135 + 30)$

$\tan 135 = -1$

$\tan 30 = \frac{\sqrt{3}}{3}$

$$= \frac{\tan 135 + \tan 30}{1 - \tan 135 \tan 30} = \frac{-1 + \frac{\sqrt{3}}{3}}{1 - (-1)\left(\frac{\sqrt{3}}{3}\right)} = \frac{-\frac{3}{3} + \frac{\sqrt{3}}{3}}{\frac{3}{3} + \frac{\sqrt{3}}{3}}$$

$$= \frac{\frac{-3+\sqrt{3}}{3}}{\frac{3+\sqrt{3}}{3}} = \frac{-3+\sqrt{3}}{\cancel{3}} \cdot \frac{\cancel{3}}{3+\sqrt{3}} = \frac{-3+\sqrt{3}}{3+\sqrt{3}} \cdot \frac{3-\sqrt{3}}{3-\sqrt{3}}$$

$$= \frac{-9 + 3\sqrt{3} + 3\sqrt{3} - 3}{9 - 3} = \frac{-12 + 6\sqrt{3}}{6} = -2 + \sqrt{3}$$

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(34) $\cos\left(\frac{\pi}{2} + x\right) = -\sin x$

$\cos\frac{\pi}{2}\cos x - \sin\frac{\pi}{2}\sin x =$

$(0)\cancel{\cos x} - (1)\sin x =$

$-\sin x = -\sin x$