Homework #53 **Answers**

From Houghton-Mifflin Precalculus: 3rd Edition

p408:

11) $\sin 105° = \sin(60° + 45°) = \sin 60° \cos 45° + \sin 45° \cos 60°$
$= (\sqrt{3}/2)(\sqrt{2}/2) + (\sqrt{2}/2)(1/2) = (\sqrt{6}/4) + (\sqrt{2}/4) = \frac{\sqrt{6} + \sqrt{2}}{4}$

$\cos 105° = \cos(60° + 45°) = \cos 60° \cos 45° - \sin 60° \sin 45°$
$= (1/2)(\sqrt{2}/2) - (\sqrt{3}/2)(\sqrt{2}/2) = (\sqrt{2}/4) - (\sqrt{6}/4) = \frac{\sqrt{2} - \sqrt{6}}{4}$

$\tan 105° = \tan(60° + 45°) = \frac{\tan 60° + \tan 45°}{1 - \tan 60° \tan 45°} = \frac{(\sqrt{3}) + 1}{1 - (\sqrt{3})(1)} = \frac{1 + \sqrt{3}}{1 - \sqrt{3}}$

13) $\sin 195° = \sin(225° - 30°) = \sin 225° \cos 30° - \cos 225° \sin 30°$
$= (-\sqrt{2}/2)(\sqrt{3}/2) - (-\sqrt{2}/2)(1/2) = (-\sqrt{6}/4) - (-\sqrt{2}/4) = \frac{-\sqrt{6} + \sqrt{2}}{4}$

$\cos 195° = \cos(225° - 30°) = \cos 225° \cos 30° + \sin 225° \sin 30°$
$= (-\sqrt{2}/2)(\sqrt{3}/2) + (-\sqrt{2}/2)(1/2) = (-\sqrt{6}/4) + (-\sqrt{2}/4) = \frac{-\sqrt{6} - \sqrt{2}}{4}$

$\tan 195° = \tan(225° - 30°) = \frac{\tan 225 - \tan 30}{1 - \tan 225° \tan 30°} = \frac{(1) - (\sqrt{3}/3)}{1 + (1)(\sqrt{3}/3)} = \frac{1 - \sqrt{3}/3}{1 + \sqrt{3}/3}$

22) $\cos 20° \cos 30° + \sin 20° \sin 30° = \cos(20° - 30°) = \cos(-10°)$ or $\cos 350°$

23) $\frac{\tan 325° - \tan 86°}{1 + \tan 325° \tan 86°} = \tan(325° - 86°) = \tan 239°$

For 35-38:

If $\sin u = 5/13$ and u is in Quadrant I, then $\cos u = 12/13$

If $\cos v = -3/5$ and v is in Quadrant II, then $\sin v = 4/5$

35) $\sin(u + v) = (5/13)(-3/5) + (12/13)(4/5) = (-15/65) + (48/64) = 33/55$

36) $\cos(v - u) = (-3/5)(12/13) + (4/5)(5/13) = (-36/65) + (20/65) = -16/65$

37) $\cos(u + v) = (12/13)(-3/5) - (5/13)(4/5) = (-36/65) - (20/65) = -56/65$

38) $\sin(u - v) = (5/13)(-3/5) - (4/5)(12/13) = (-15/65) - (48/65) = -63/65$

47) $\sin(x + y) + \sin(x - y) = 2 \sin x \cos y$

$\sin x \cos y + \cos x \sin y + \sin x \cos y - \cos x \sin y = 2 \sin x \cos y$

$2 \sin x \cos y = 2 \sin x \cos y$