Turn in homework:

6.1 Handout: #13-23 odd

6.2 Handout: #1-23 odd; 35-41 odd

6.3 Handout: #1-24; 30-36 all

(everything except 6.3 proofs)

6.3 handout $\sin 2(\theta) = 2\sin\theta\cos\theta$

66. $\sin 4x = 4\sin x\cos x - 8\cos x\sin^3 x$

LHS $= \sin 2(2x) = 2\sin 2x\cos 2x =$

$= 2(2\sin x\cos x)(1-2\sin^2 x)$

$2(2\sin x\cos x) = 4\sin x\cos x$

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

$= 4\sin x\cos x - 8\sin^3 x\cos x$

$=$ RHS.

68. $\sin 3x + \sin x = 4\sin x - 4\sin^3 x$

$LHS = \sin(2x+x) + \sin x$

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

$= 2\sin x \cos x \cos x + (1 - 2\sin^2 x)\sin x + \sin x$

$= 2\sin x \cos^2 x + \sin x - 2\sin^3 x + \sin x$

$= 2\sin x - 2\sin^3 x + 2\sin x(1 - \sin^2 x)$

$\sin^2 x + \cos^2 x = 1$

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

$= 2\sin x - 2\sin^3 x + 2\sin x - 2\sin^3 x$

$= 4\sin x - 4\sin^3 x$

$= RHS.$

72. $\cos^2 \frac{x}{2} = \frac{\sec x + 1}{2\sec x}$

$LHS = \left(\cos \frac{x}{2}\right)^2 = \left(\pm\sqrt{\frac{1+\cos x}{2}}\right)^2$

$= \frac{1+\cos x}{2} \quad \frac{\sec x}{\sec x}$

$= \frac{1 + \frac{1}{\sec x}}{2}$

$= \frac{\frac{\sec x + 1}{\sec x}}{\frac{2}{1}} = \frac{\sec x + 1}{\sec x} \cdot \frac{1}{2}$

$= \frac{\sec x + 1}{2\sec x} = RHS.$

76. $\cos^2\frac{x}{2} - \sin^2\frac{x}{2} = \cos x$

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

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

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

$$= \frac{2\cos x}{2} = \cos x = RHS.$$

86. $\frac{\cos 2x}{\sin^2 x} = \csc^2 x - 2$

$$LHS = \frac{1-2\sin^2 x}{\sin^2 x} = \frac{1}{\sin^2 x} - \frac{2\sin^2 x}{\sin^2 x}$$

$$= \csc^2 x - 2 = RHS$$

$$LHS = \frac{\cos^2 x - \sin^2 x}{\sin^2 x} = \frac{\cos^2 x}{\sin^2 x} - \frac{\sin^2 x}{\sin^2 x}$$

$$= \cot^2 x - 1 =$$

$$= \csc^2 x - 1 - 1 =$$

$$= \csc^2 x - 2 = RHS.$$

$\cot^2 x + 1 = \csc^2 x$

$\cot^2 x = \csc^2 x - 1$

88. $\frac{2(\cos 2x)}{\sin 2x} = \cot x - \tan x$

$LHS = \frac{2(\cos^2 x - \sin^2 x)}{2\sin x \cos x}$

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

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

$= \cot x - \tan x = RHS.$

HW

continue working on 6.3 proofs