

# Block HW (3/18 & 3/19)

Trig I-2: 19, 25, 27, 29

$$19. \frac{1}{1+\tan^2\theta} + \frac{1}{1+\cot^2\theta} = \frac{1}{\sec^2\theta} + \frac{1}{\csc^2\theta} = \cos^2\theta + \sin^2\theta = \boxed{1}$$

$$25. (\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2$$

$$= \sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta + \sin^2\theta - 2\sin\theta\cos\theta + \cos^2\theta$$

$$= \sin^2\theta + \cos^2\theta + \sin^2\theta + \cos^2\theta$$

$$= \underbrace{1} + \underbrace{1} = \boxed{2}$$

$$29. \frac{\sin x}{\sin x - \cos x} - \frac{1 - \cos x}{\sin x} \cdot \frac{(1 - \cos x)}{1 + \cos x} = \frac{\sin^2 x - (1 - 2\cos x + \cos^2 x)}{\sin x(1 - \cos x)}$$

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

$$= \frac{2\cos x(1 - \cos x)}{\sin x(1 - \cos x)} = 2 \cdot \frac{\cos x}{\sin x} = \boxed{2\cot x}$$

$$27. (\tan^2\alpha \sec^2\alpha - \sec^2\alpha) + 1 = \sec^2\alpha(\tan^2\alpha - 1) + 1 = \frac{\sin^2\alpha}{\cos^2\alpha} \cdot \frac{1}{\cos^2\alpha} - \frac{1}{\cos^2\alpha} + \frac{\cos^4\alpha}{\cos^4\alpha}$$

$$= \frac{\sin^2\alpha - \cos^2\alpha + \cos^4\alpha}{\cos^4\alpha} = \frac{1 - \cos^2\alpha - \cos^2\alpha + \cos^4\alpha}{\cos^4\alpha} = \frac{1 - 2\cos^2\alpha + \cos^4\alpha}{\cos^4\alpha}$$

$$= \frac{(1 - \cos^2\alpha)^2}{\cos^4\alpha} = \frac{(\sin^2\alpha)^2}{\cos^4\alpha} = \frac{\sin^4\alpha}{\cos^4\alpha} = \boxed{\tan^4\alpha}$$

$$\rightarrow \tan^2\alpha \sec^2\alpha - (\sec^2\alpha - 1) = \tan^2\alpha \sec^2\alpha - \sec^2\alpha + 1 = \tan^2\alpha(\sec^2\alpha - 1) = \tan^2\alpha \cdot \tan^2\alpha = \boxed{\tan^4\alpha}$$

# BOOK WORK

$$19. \csc \theta \cdot \cos \theta = \boxed{\cot \theta}$$
$$= \frac{1}{\sin \theta} \cdot \cos \theta = \frac{\cos \theta}{\sin \theta} = \boxed{\cot \theta} \checkmark$$

$$23. \cos \theta (\tan \theta + \cot \theta) = \boxed{\csc \theta}$$
$$\cos \theta \tan \theta + \cos \theta \cot \theta = \cos \theta \cdot \frac{\sin \theta}{\cos \theta} + \cos \theta \cdot \frac{\cos \theta}{\sin \theta} = \sin \theta + \frac{\cos^2 \theta}{\sin \theta}$$
$$= \frac{\sin^2 \theta + \cos^2 \theta}{\sin \theta} = \frac{1}{\sin \theta} = \boxed{\csc \theta} \checkmark$$

$$25. \tan u \cot u - \cos^2 u = \boxed{\sin^2 u}$$
$$\tan u \cdot \frac{1}{\tan u} - \cos^2 u = 1 - \cos^2 u = \boxed{\sin^2 u}$$

$$27. (\sec \theta - 1)(\sec \theta + 1) = \boxed{\tan^2 \theta}$$
$$\sec^2 \theta - 1 = \boxed{\tan^2 \theta} \checkmark$$

$$29. (\sec^2 \theta + \tan^2 \theta)(\sec \theta - \tan \theta) = \boxed{1}$$
$$\sec^2 \theta - \tan^2 \theta = \boxed{1} \checkmark$$

$$31. \cos^2 \theta (1 + \tan^2 \theta) = \boxed{1}$$
$$\cos^2 \theta \cdot \sec^2 \theta = \cos^2 \theta \cdot \frac{1}{\cos^2 \theta} = \boxed{1} \checkmark$$

$$33. (\sin \theta + \cos \theta)^2 + (\sin \theta - \cos \theta)^2 = \boxed{2}$$
$$\sin^2 \theta + 2 \sin \theta \cos \theta + \cos^2 \theta + \sin^2 \theta - 2 \sin \theta \cos \theta + \cos^2 \theta$$
$$\sin^2 \theta + \cos^2 \theta + \sin^2 \theta + \cos^2 \theta$$
$$1 + 1 = \boxed{2} \checkmark$$

$$35. \sec^4 \theta - \sec^2 \theta = \boxed{\tan^4 \theta + \tan^2 \theta}$$

$$\sec^2 \theta (\sec^2 \theta - 1)$$

$$(1 + \tan^2 \theta) \tan^2 \theta = \tan^2 \theta + \tan^4 \theta = \boxed{\tan^4 \theta + \tan^2 \theta} \checkmark$$

$$4. \frac{1 + \sin \theta}{1 + \sin \theta} - \frac{\cos^2 \theta}{1 + \sin \theta} = \boxed{\sin \theta}$$

$$\frac{1 + \sin \theta - \cos^2 \theta}{1 + \sin \theta} = \frac{1 - \cos^2 \theta + \sin \theta}{1 + \sin \theta} = \frac{\sin^2 \theta + \sin \theta}{1 + \sin \theta} = \frac{\sin \theta (\sin \theta + 1)}{1 + \sin \theta}$$

$$= \boxed{\sin \theta} \checkmark$$

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