Honors PreCalc – Chapter 5 Homework Packet

Simplify each expression

1) $\sin\theta \cdot \csc\theta$

2) $\cot\theta \cdot \sec\theta$

3) $\csc^2\theta \cdot \cos^2\theta$

4) $\cos^2\theta \cdot \tan\theta \cdot \sec\theta$

5) $\sin\theta(\csc\theta - \sec\theta)$

6) $\dfrac{\sec^2\theta}{\tan^2\theta}$

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

8) $\dfrac{\csc^2\theta \cdot \cos^2\theta}{\tan^2\theta}$

9) $\tan\theta(\cos\theta + 2\cot\theta)$

10) $\csc^2\theta(\sin^2\theta + 1)$

11) $1 - \dfrac{\sin^2\theta}{\tan^2\theta}$

12) $\dfrac{\sin\theta\cos\theta}{1-\cos^2\theta}$

13) $\dfrac{\tan\theta + \sin\theta\sec\theta}{\csc\theta\tan\theta}$

14) $\dfrac{\cos\theta}{\sec\theta+1} + \dfrac{\cos\theta}{\sec\theta-1}$

15) $\dfrac{1-\sin^2\theta}{1-\cos^2\theta} \cdot \tan\theta$

16) $\dfrac{\sin^2\theta + 3\sin\theta + 2}{\sin^2\theta + 2\sin\theta}$

17) $\dfrac{\cos^2\theta - \sin^2\theta}{\cos^2\theta + \cos\theta\sin\theta}$

Use a two-column proof to prove that one side of the equation is equal to the other side. Give reasons for each step.

18) $\sin^2\theta\sec\theta\csc\theta=\tan\theta$

19) $\csc\theta-\sin\theta=\cot\theta\cos\theta$

20) $\tan\theta\,[\cos(90°-\theta)+\cot\theta\cos\theta]=\sec\theta$

21) $\dfrac{1}{\sin\theta\cos\theta}-\dfrac{\cos\theta}{\sin\theta}=\tan\theta$

Transform one side of the equation to the other side.

22) $\dfrac{1+\cot^2 x}{\sec^2 x}=\cot^2 x$

23) $\dfrac{\sec\theta}{\sin\theta}-\dfrac{\sin\theta}{\cos\theta}=\cot\theta$

24) $\frac{1}{\sec x-\tan x}+\frac{1}{\sec x+\tan x}=2\sec x$

25) $\frac{\cos\theta}{\sec\theta-1}-\frac{\cos\theta}{\tan^2\theta}=\cot^2\theta$

26) $\sec^2 x+\csc^2 x=\sec^2 x\csc^2 x$

27) $\frac{1-3\cos\theta-4\cos^2\theta}{\sin^2\theta}=\frac{1-4\cos\theta}{1-\cos\theta}$

28) $\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\csc\theta$

29) $\frac{1}{\sec x-\tan x}=\sec x+\tan x$

30) $\frac{1}{\sec^2 x}+\frac{1}{\csc^2 x}=1$

31) $\frac{\sin^3 x+\cos^3 x}{\sin x+\cos x}=1-\sin x\cos x$

32) Write out each of the six trig functions in terms of $\sin\theta$.

33) Fill in each blank with an angle measure that would make the statement true.

$\csc 11° = \sec$______

$\tan 42° = \cot$______

$\sin\frac{\pi}{7} = \cos$______

$\cos 147° = \sin$_______

$\tan\frac{52\pi}{17} = \cot$_______

$\sec 312° = \csc$______

Simplify.

34) $\sin 75^\circ \cos 15^\circ + \cos 75^\circ \sin 15^\circ$

35) $\cos\frac{5\pi}{12}\cos\frac{\pi}{12} - \sin\frac{5\pi}{12}\sin\frac{\pi}{12}$

36) $\sin 3x \cos 2x - \cos 3x \sin 2x$

37) $\cos 2x \cos x + \sin 2x \sin x$

38) $\dfrac{\tan 100^0 + \tan 50^0}{1 - \tan 100^0 \tan 50^0}$

39) $\dfrac{\tan\frac{2\pi}{3} + \tan\frac{\pi}{12}}{1 - \tan\frac{2\pi}{3}\tan\frac{\pi}{12}}$

40) $\dfrac{\tan 2\theta - \tan\theta}{1 + \tan 2\theta \tan\theta}$

41) $\cos\dfrac{\pi}{2}\cos x + \sin\dfrac{\pi}{2}\sin x$

42) $\sin 3y \cos y + \cos 3y \sin y$

43) $\cos\left(\dfrac{\pi}{3} + \theta\right) + \cos\left(\dfrac{\pi}{3} - \theta\right)$

44) $\dfrac{\sin(\alpha+\beta) + \sin(\alpha-\beta)}{\cos\alpha\cos\beta}$

45) $\dfrac{\cos(\alpha+\beta) + \cos(\alpha-\beta)}{\sin\alpha\sin\beta}$

Determine the exact value.

46) $\sin\dfrac{11\pi}{12}$

47) $\cos 15^{\circ}$

48) $\sec\dfrac{5\pi}{12}$

49) $\tan 105^{0}$

50) Suppose that $\sin\alpha = \frac{4}{5}$ and $\sin\beta = \frac{1}{2}$ where $\frac{\pi}{2} < \beta < \alpha < \pi$. Evaluate $\sin(\alpha - \beta)$.

51) Suppose that $\tan\alpha = \frac{4}{3}$ and $\tan\beta = \frac{12}{5}$ where $0 < \alpha < \beta < \frac{\pi}{2}$. Evaluate $\cos(\alpha - \beta)$.

52) Given that $\sin\alpha = \frac{12}{13}$ and $\cos\beta = -\frac{4}{5}$, where $0 < \alpha < \frac{\pi}{2} < \beta < \pi$, evaluate $\sin(\beta - \alpha)$.

53) Given that $\tan\alpha = 2$ and $\tan\beta = -\frac{1}{3}$, determine $\tan(\alpha + \beta)$ and $\tan(\alpha - \beta)$

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

55) Suppose $\sin A = \frac{5}{13}$ and $\frac{\pi}{2} < A < \pi$. Suppose $\tan B = \frac{7}{24}$ and $\pi < B < \frac{3\pi}{2}$. Determine the following values.

a) $\cos 2B$

b) $\sec(A-B)$

c) $\sin(2A)$

d) $\tan(A+B)$

e) $\tan(2A)$

f) $\sin(A+B)$

56) Use trigonometric identities to simplify each expression. Leave as an exact answer with a positive argument.

a) $2\cos^2 35° - 1$

b) $\sin\frac{\pi}{7}\cos\frac{\pi}{7}$

c) $6\sin x \cos x$

d) $0.5 - \sin^2 b$

e) $\sin 11° \sin 11° - \sin 79° \cos 11°$

f) $\frac{\tan\frac{\pi}{3} - \tan(-\frac{\pi}{5})}{1 - \tan\frac{\pi}{3}\tan\frac{\pi}{5}}$

g) $\frac{1-\cos 80°}{2}$

h) $\frac{\cos 64° + 1}{2}$

i) $\frac{2\tan Y}{1-\tan^2 Y}$

j) $2\sin u \cos u$

k) $1 - 2\sin^2(p)$

57) Prove: $\sin\left(x+\frac{\pi}{3}\right)+\sin\left(x-\frac{\pi}{3}\right)=\sin x$

58) Prove: $\csc 2A=\frac{\csc A}{2\cos A}$

59) Write $\cos^4 x$ as the sum or difference of cosines that are raised to the first power.

60) Write the expression $\cos(2\arcsin x)$ as an algebraic expression.

61) Suppose $\tan A=\frac{3}{4}$ and $180°<A<270°$. What is $\sin\left(\frac{1}{2}A\right)$, $\cos\left(\frac{1}{2}A\right)$, and $\tan\left(\frac{1}{2}A\right)$?

62) Solve the equation for $0 \le \theta < 2\pi$.

a) $\sin\frac{\theta}{2} = -1$

b) $\cos\theta - 1 = \sin^2\theta$

c) $\sin 2\theta \cos\theta = \sin\theta$

d) $\cos 2\theta = -2\cos^2\theta$

e) $\tan 2\theta - \tan\theta = 0$

f) $\cos(2\theta + \pi) = -1$

g) $\sin 3\theta = \cos 3\theta$

h) $-6 + 10\cos\left(\theta + \frac{\pi}{2}\right) = -1$

63) Solve for $x \in \mathbb{R}$: $\sin(2x) = -\frac{4}{5}$

64) Solve for $x \in \mathbb{R}$: $7\sin^2 x - 1 = 4$

65) Solve for $x \in \mathbb{R}$: $15 = 1 - 7\cot(x + 6°)$

66) Solve for $\theta \in [0, 2\pi)$: $4\sin^2\theta + 8\sin\theta = -3$

Solve the following questions for $x \in [0, 2\pi)$.

67) $1 + \cos x = -\sin x$

68) $\dfrac{\sin\left(\dfrac{\pi}{2} - x\right)}{\sin x} = -\sqrt{3}$

69) $\cos x - \sqrt{3}\sin x = 1$

70) $\csc x + \cot x = 1$

71) $\sin\left(x + \dfrac{\pi}{2}\right) - \cos^2 x = 0$

72) $\tan^2 x + 4\tan x = 6$

Solve the following equations for $x \in \mathbb{R}$ (in degrees).

73) $\sec^2(5x) - 1 = 16$

74) $2\cos^2\left(\dfrac{1}{2}x\right) - 2 = 2\cos x$

75) $\sin 3x \cos 80° - \sin 80° \cos 3x = -0.36$

76) Determine the general solution(s) of the equation in radians.

a) $2\sin^2\theta\tan\theta = \tan\theta$

b) $\tan^2 3\theta = 3$

c) $\sin 3\theta = -\frac{\sqrt{3}}{2}$

d) $\cos\theta\csc^2\theta + 3\cos\theta = 7\cos\theta$