BASIC ALGEBRAIC OPERATIONS

A. Factor the following expressions:

1. $\sin^2 x - \cos^2 x$
2. $\csc^2 x - \cot^2 x$
3. $\sin^2(3x) - \cos^2(3x)$
4. $\tan^2(x+1) - \sec^2(x+1)$
5. $\sin^3 x - \cos^3 x$
6. $\sec^3(3x-2) + \csc^3(3x-2)$
7. x $\tan^4 x - \cot^4 x$
8. $\cos^4(2x) - \sin^4(2x)$
9. $\sin^2 x - \sin x - 6$
10. $\cos^2 x + 9\cos x + 18$
11. $\tan^2 x - 20\tan + 75$
12. $12 - 7\sin x \cos x + \cos^2 x \sin^2 x$
13. $\tan^2 x - 12\tan x - 45$
14. $4\csc^2 x - 24\csc x + 11$
15. $35\cot^2 x - 31\cot x + 6$
16. $6\sec^x - 5\sec x - 21$

B. Simplify the following:

1. $\sin(2 - \sin x)$
2. $\cos x(\tan x + \sin x)$
3. $(\sec x + 2)(4 - \sec x)$
4. $(\tan x + \sin x)(\tan x - \sin x)$
5. $(\sec x - \cos x)^2$
6. $(3\sec x + 4)(2\sec x - 3)$

C. Simplify the following:

1. $\dfrac{3\sin x}{12\sin x + 3}$
2. $\dfrac{\cos^2 x}{\cos^3 x - \cos x}$
3. $\dfrac{6\sin^2 x + \sin x - 12}{6\sin^2 x - 17\sin x + 12}$
4. $\dfrac{4\tan^2 x - 14\tan + 6}{10\tan x - 5}$
5. $\dfrac{6\sec x + 12}{3\sec x - 9} \cdot \dfrac{5\sec x - 15}{4\sec x + 8}$
6. $\dfrac{3\cos^2 x + 5\cos x - 2}{9\cos^2 x - 1}$
7. $\dfrac{8\cos^2 x - 1}{2\cos x} + \dfrac{2\cos^2 x + 1}{2\cos x}$
8. $\dfrac{6\sec x + 3\tan x}{\sec x - \tan x} - \dfrac{9\tan x}{\sec x - \tan x}$
9. $\dfrac{1}{\cot x + 1} - \dfrac{\cot x - 5}{\cot^2 x + 6\cot x + 5}$
10. $\dfrac{1}{2\cos x + 6} + \dfrac{5\cos x}{\cos^2 x + 4\cos x + 3}$