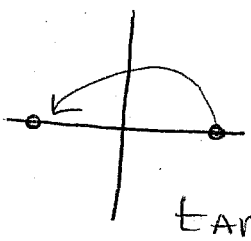
SOLUTIONS - BONUS TRIG EQUATIONS MATH 171

(1) $\tan^2 x - \sqrt{3}\tan x = 0$

$\tan x(\tan x - \sqrt{3}) = 0$

$\tan x = 0$

$\tan^{-1}(0) = 0°$



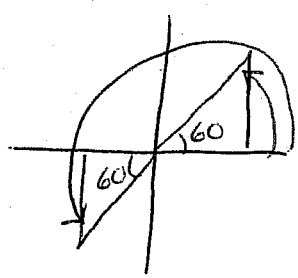
$x = 0°$

$x = 180°$

$\tan x = y/x$

$\tan x = \sqrt{3}$

$\tan^{-1}(\sqrt{3}) = 60°$



$x = 60°$

$x = 180 + 60° = 240°$

SOLUTIONS ARE $\boxed{0°, 60°, 180°, 240°}$

(2) $\sin^2 x - 2\sin x - 3 = 0$

$(\sin x - 3)(\sin x + 1) = 0$

~~$\sin x = 3$~~ $\sin x = -1$

IMPOSSIBLE

$\sin^{-1}(1) = 0°$ Reference Angle is $0°$, so solutions must lie on x or y axis

$\boxed{x = 270°}$ (because y must be negative)

(3) $4\cos^2 x - 4\cos x + 1 = 0$

$4\cos^2 x - 2\cos x - 2\cos x + 1 = 0$

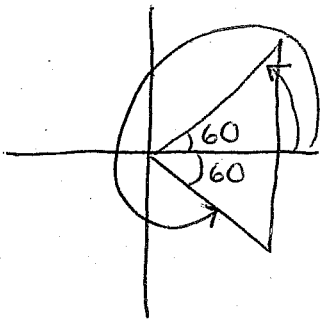
$2\cos x(2\cos x - 1) - 1(2\cos x - 1) = 0$

$(2\cos x - 1)^2 = 0$

$2\cos x - 1 = 0$

$\cos x = 1/2$

$\cos^{-1}(1/2) = 60°$



$x = 60°$

$x = 360 - 60° = 300°$

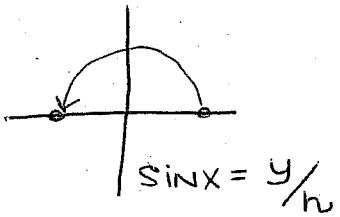
SOLUTIONS ARE $\boxed{60°, 300°}$

(4) $2\sin^2 x + \sin x = 0$

$\sin x(2\sin x + 1) = 0$

$\sin x = 0$

$\sin^{-1}(0) = 0°$



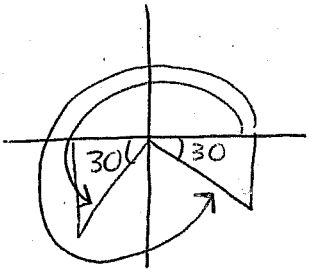
$x = 0°$

$x = 180°$

$2\sin x + 1 = 0$

$\sin x = -1/2$

$\sin^{-1}(1/2) = 30°$



$x = 180 + 30 = 210°$

$x = 360 - 30 = 330°$

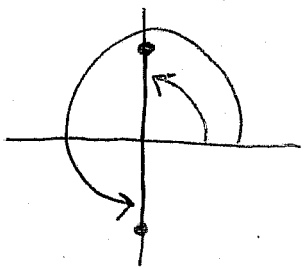
THE SOLUTIONS ARE $\boxed{0°, 180°, 210°, 330°}$

(5) $\cos x - 2\cos x \sin x = 0$

$\cos x (1 - 2\sin x) = 0$

$\cos x = 0$

$\cos^{-1}(0) = 90°$



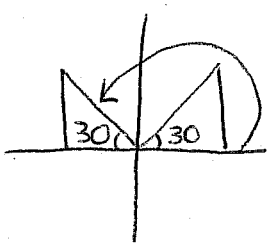
$x = 90°$

$x = 270°$

$1 - 2\sin x = 0$

$\sin x = 1/2$

$\sin^{-1}(1/2) = 30°$



$x = 30°$

$x = 180 - 30 = 150°$

Solutions Are

$\boxed{x = 30°, 90°, 150°, 270°}$

(6) $9\sec^2 x - 12 = 0$

$9\sec^2 x = 12$

$\sec^2 x = 12/9$

$\sec^2 x = 4/3$

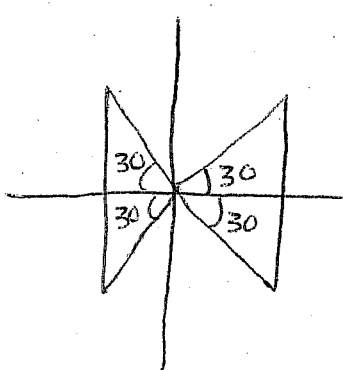
$\sec x = \pm\sqrt{4/3}$

$\sec x = \pm 2/\sqrt{3}$

$\frac{1}{\cos x} = \pm \frac{2}{\sqrt{3}}$

$\cos x = \pm \frac{\sqrt{3}}{2}$

$\cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = 30°$



$\boxed{x = 30°, 150°, 210°, 330°}$