1. $u^2 - u + 1 - \frac{1}{u+1}$

2. $\frac{-5b^4}{81x}$

3 4

4 125

5 $25\sqrt{3}$

6 $\frac{x^2+15}{(x-3)^2(x+1)}$

7. $\left(x-\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2$

8. $\left(x+\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2$

9. $x^2 - \left(\sqrt{7}\right)^2$

10. $\frac{3-2x}{2-x}$

11 $\frac{x-3}{x-1}$

12 b^3c^2

13 (b) $\log a - \log b$

14 $+5, -2$

15 $0, -\frac{5}{3}$

16 $x = 3, -2$

17 NO SOLUTION

18 $x = 1, y = -3, z = -7$

19 False

20 $12/5$

21 True

22 $\sqrt{1-x^2}$

23 False

24 $24/25$

25 True

26 3

27 $\frac{\sin x}{\cos x}$

28 $\cos^2 x$

29 25π

30. 6

ALGEBRA / TRIG QUIZ # 7, 8, 9, 10, 11, 12, 14, 16, 17, 18, 25, 26

7. $x^2 - x + 1$ (use basic formula $(a \pm b)^2 = a^2 \pm 2ab + b^2$)

$= x^2 - 2 \times \frac{1}{2} + \left(\frac{1}{2}\right)^2 - \left(\frac{1}{2}\right)^2 + 1$

$= \left(x - \frac{1}{2}\right)^2 + \frac{3}{4} = \underline{\left(x - \frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2}$

8. $x^2 + 3x$

$= x^2 + 2 \times \frac{3}{2} + \left(\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2$

$= \underline{\left(x + \frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2}$

9. $x^2 - 7$

$= (x)^2 - (\sqrt{7})^2$

10. $1 + \dfrac{1}{1 + \frac{1}{1-x}}$

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

$= 1 + \dfrac{1-x}{2-x} = \dfrac{2-x}{2-x} + \dfrac{1-x}{2-x} = \dfrac{2-x+1-x}{2-x} = \underline{\dfrac{3-2x}{2-x}}$

11. $\dfrac{\frac{1}{x-1} - \frac{1}{x-2}}{\frac{1}{x-2} - \frac{1}{x-3}} = \dfrac{\frac{1}{x-1} \cdot \frac{x-2}{x-2} - \frac{1}{x-2} \cdot \frac{x-1}{x-1}}{\frac{1}{x-2} \cdot \frac{x-3}{x-3} - \frac{1}{x-3} \cdot \frac{x-2}{x-2}} = \dfrac{\frac{x-2-(x-1)}{(x-1)(x-2)}}{\frac{x-3-(x-2)}{(x-2)(x-3)}}$

$= \dfrac{\frac{-1}{(x-1)(x-2)}}{\frac{-1}{(x-2)(x-3)}} = \dfrac{-1}{(x-1)(x-2)} \cdot \dfrac{(x-2)(x-3)}{-1} = \underline{\dfrac{x-3}{x-1}}$

12. $a^{3\log_a b + 2\log_a c}$

$= a^{3\log_a b} \cdot a^{2\log_a c}$

$= a^{\log_a(b^3)} \cdot a^{\log_a(c^2)}$

$= \underline{b^3 \cdot c^2}$

NOTE: ① $\log_d e = 1 \iff d^1 = e \iff d^{\log_d e} = e$ ② $n\log a = \log(a^n)$ ③ $a^{b+c} = a^b \cdot a^c$

14 $x^2 - 3x - 10 = 0$ Quadratic formula $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \dfrac{-(-3) \pm \sqrt{3^2 - 4\cdot 1\cdot(-10)}}{2\cdot 1} = \dfrac{3 \pm \sqrt{9+40}}{2} = \dfrac{3 \pm \sqrt{49}}{2} = \dfrac{3 \pm 7}{2}$

$= \dfrac{3+7}{2}$ or $\dfrac{3-7}{2} = \dfrac{10}{2}$ or $\dfrac{-4}{2} = \underline{5 \text{ or } -2}$

16. $\dfrac{x}{x-2} + \dfrac{x-1}{2} = x+1$

$\dfrac{x\cdot 2}{(x-2)2} + \dfrac{x-1}{2}\cdot\dfrac{x-2}{x-2} = x+1$

$\dfrac{2x + x^2 - 3x + 2}{2(x-2)} = x+1$

$\dfrac{x^2 - x + 2}{2(x-2)} = x+1$

$\Rightarrow x^2 - x + 2 = (x+1)2(x-2)$

$\Rightarrow x^2 - x + 2 = 2(x^2 - x - 2)$

$\Rightarrow x^2 - x + 2 = 2x^2 - 2x - 4$

$\Rightarrow 0 = x^2 - x - 6$

$= (x-3)(x+2)$

$\Rightarrow \underline{x = 3 \text{ or } -2}$

17. $2x + y = 6$

$4x + 2y = 8 \Rightarrow 2x + y = 4$ $\Rightarrow \underline{0 = 2}$ impossible

$\therefore$ equations are inconsistent

$\therefore$ no solution

18. $3x + 4y - z = -2$

$2x - 3y + z = 4$

$x - 6y + 2z = 5$

$5x + y = 2 \Rightarrow -10x - 2y = -4$

$6x + 8y - 2z = -4 \Rightarrow 7x + 2y = 1$

$-3x = -3$

$\Rightarrow \underline{x = 1}$

$5\cdot 1 + y = 2 \Rightarrow y = 2 - 5 = -3 \Rightarrow \underline{y = -3}$

$2\cdot 1 - 3(-3) + z = 4$

$\Rightarrow 2 + 9 + z = 4 \Rightarrow z = 4 - 11 = -7$ $\Rightarrow \underline{z = -7}$

25 $1 + \sin 2x \overset{?}{=} (\sin x + \cos x)^2$

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

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

$= \underbrace{\sin^2 x + \cos^2 x}_{1} + 2\sin x \cos x$

SAME

$\therefore$ TRUE

26 $\sin^4 x + 2\sin^2 x \cos^2 x + \cos^4 x + 2$

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

$= 1^2 + 2 = 1 + 2 = 3$