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(1) By drawing two different graphs, state the number of roots to the equation $\frac{2}{x} = -x$

(2) (a) Prove that $\tan^4 x - 1 \equiv \frac{\sin^2 x - \cos^2 x}{\cos^4 x}$

(b) Hence, solve the equation $\frac{\sin^2 x - \cos^2 x}{\cos^4 x} = 8, \quad 0 < x < 360$

(3) Explain why there is not a term independent of x in the expansion $(x - x^{-1})^n$ where n is an odd positive integer.

(4) (a) Sketch the graph of $y = x^3 + x^2 - 12x$

(b) Hence, sketch the graphs of

(i) $y = 1 + x^3 + x^2 - 12x$, ONLY y intercept required (ii) $y = 8x^3 + 4x^2 - 24x$ ALL intercepts

(5) Prove that the line with equation $x + y = 10$ is not a tangent to the circle with equation $x^2 + y^2 = 4$

(6) Given that $\sin B = 0.2$ find the possible values of $\tan B$ giving a justification for your answer.

(7) Prove that the sum of the squares of 2 consecutive odd numbers is two more than a multiple of 4.

(8) The circle with equation $x^2 + y^2 + 14x + 12y + 75 = k$ where k is a constant, lies entirely in the 3rd quadrant.

Find the possible values of k.

(9) Solve the equation $\tan x + \frac{3}{\tan x} = -4, \quad -180 < x < 180$

(10) A triangle has side lengths 3, 5 and 7. The largest angle in the triangle is x. Prove without calc that $\sin x = -\frac{\sqrt{3}}{2}$