Algebraic Fractions and Proof Revision

1) Simplify fully

a) $\frac{2x-10}{x^2-25}$ b) $\frac{x^2-3x+2}{2x^2-x-6}$

2) Calculate

a) $\frac{2x^3}{x^2+5x-6} \times \frac{x^2-1}{4x^3+4x^2}$ b) $\frac{x^2-2x-8}{2x+8} \div \frac{3x^2-48}{4x}$

c) $\frac{2x-1}{6} - \frac{x-5}{8}$ d) $\frac{x-1}{x^2+5x+6} + \frac{6}{x^2-2x-15}$

3) Solve

a) $\frac{x-7}{4} - \frac{2x-5}{5} = 2$ b) $\frac{5}{x-1} + \frac{4}{2x-5} = 3$

4) Prove that the difference between the squares of 2 consecutive odd numbers is a multiple of 8.

5) Prove that the sum of the squares of consecutive integers is odd.

Answers

1a) $\frac{2}{x+5}$ b) $\frac{x-1}{2x+3}$ 2a) $\frac{x}{2(x+6)}$ b) $\frac{2x(x+2)}{(x+4)(x+4)}$ c) $\frac{5x+11}{24}$ d) $\frac{x^2+17}{(x+2)(x+3)(x-5)}$

3a) $-\frac{55}{3}$ b) 4, $\frac{11}{6}$

Proofs overleaf

4) first odd = 2n+1 second odd = 2n+3

$(2n + 3)^2 - (2n + 1)^2$

= $4n^2 + 12n + 9 - (4n^2 + 4n + 1)$

$= 8n + 8$

$= 8(n + 1)$ which is a multiply of 8

5) first integer = n second integer = n+1

$n^2 + (n + 1)^2$

$= n^2 + n^2 + 2n + 1$

$= 2n^2 + 2n + 1$

$= 2(n^2 + n) + 1$ which is an odd number