## hw q5,q6,q7 ex 4c

5) a) Express $\frac{2x^2+7x-6}{(x+5)(x-4)}$ in partial fractions

$\frac{2x^2+7x-6}{(x+5)(x-4)} = \frac{A}{(x+5)} + \frac{B}{(x-4)}$

$2x^2 + 7x - 6 \equiv A(x-4) + B(x+5)$

sub x = 4

$2(-5)^2 + 7(-5) - 6 = -9A$

$A = -1$

sub x = -5

$2(4)^2 + 7(4) - 6 \equiv 9B$

$B = 6$

(get 2 from poly long div)

therefore $\frac{2x^2+7x-6}{(x+5)(x-4)} = 2 + \frac{-1}{(x+5)} + \frac{6}{(x-4)}$

✓

b) Hence, or otherwise, expand $\frac{2x^2+7x-6}{(x+5)(x-4)}$ in ascending powers of x as far as the term in x^2

$\frac{-1}{(x+5)} = -1(x+5)^{-1} = -1(5+x)^{-1} = -5(1+x)^{-1}$

$\frac{6}{(x-4)} = 6(x-4)^{-1} = 6(-4+x)^{-1} = -24(1-x)^{-1}$

$(1+x)^n = 1 + nx + \frac{n(n-1)x^2}{2!}$

$-5[(1+x)^{-1} = 1 - x + x^2] = -5 + 5x - 5x^2$

$-24[(1-x)^{-1} = 1 + x + x^2] = -24 - 24x - 24x^2$

so $\frac{2x^2+7x-6}{(x+5)(x-4)} = -5 + 5x - 5x^2 - 24 - 24x - 24x^2$

$\frac{2x^2+7x-6}{(x+5)(x-4)} = -29 - 19x - 29x^2$

$X$

c)

$|x| < 4$

✓

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6) $\frac{3x^2+4x-5}{(x-3)(x-2)} = A + \frac{B}{x+3} + \frac{C}{x-2}$

a) Find the values of the constants A, B and C

$\frac{3x^2+4x-5}{(x-3)(x-2)} = 3 + \frac{19x-23}{(x+3)(x-2)}$

$\frac{3x^2+4x-5}{(x-3)(x-2)} = 3 + \frac{B}{x+3} + \frac{C}{x-2}$

$3x^2 + 4x - 5 = 3(x-2)(x+3) + B(x-2) + C(x+3)$

sub x = 2

$3(2)^2 + 4(2) - 5 = 3(0)(5) + 0B + 5C$

$C = 3$

sub x = -3

$3(-3)^2 + 4(-3) - 5 = 3(-5)(0) - 5B + 0C$

$B = -2$

Therefore $A = 3, B = -2, c = 3$

✓

B) Hence or otherwise expand $\frac{3x^2+4x-5}{(x-3)(x-2)}$ in ascending powers of x, as far as the term xˆ2.

$\frac{3x^2+4x-5}{(x-3)(x-2)} = 3 + \frac{-2}{x+3} + \frac{3}{x-2}$

$\frac{3x^2+4x-5}{(x-3)(x-2)} = 3 + -2(x+3)^{-1} + 3(x-2)^{-1}$

$-2(x+3)^{-1} = -6(1+x)^{-1}$

$-6[(1+x)^{-1} = 1 + x + x^2]$

$3(x-2)^{-1} = -6(1+x)^{-1}$

$-6[(1+x)^{-1} = 1 + x + x^2]$

$-6[(1+x)^{-1} = 1 + x + x^2] - 6[(1+x)^{-1} = 1 + x + x^2] = -12 - 12x - 12x^2$

$X$

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7) $\frac{2x^2+5x+11}{(2x-1)^2(x+1)}, |x| < \frac{1}{2}$

f(x) can be expressed in the form

$f(x) = \frac{A}{2x-1} + \frac{B}{(2x-1)^2} + \frac{C}{x+1}$

a) Find the values of A,B and C

$\frac{2x^2+5x+11}{(2x-1)^2(x+1)} \equiv \frac{A}{2x-1} + \frac{B}{(2x-1)^2} + \frac{C}{x+1}$

$2x^2 + 5x + 11 \equiv A(2x-1)(x+1) + B(x+1) + C(2x-1)^2$

sub $x = -1$

$2(-1)^2 + 5(-1) + 11 = 9C$

$8 = 9C$

$C = \frac{8}{9}$

sub $x = \frac{1}{2}$

$2(\frac{1}{2})^2 + 5(\frac{1}{2}) + 11 = 1.5B$

$B = \frac{28}{3}$

To get A sub both b and c into the main formulae and solve

$A = \frac{-7}{9}$

✓

B) Hence or otherwise find the series expansion of f(x), in ascending pwoers of x, up to and including the term in x^2 Simplifying each term

$\frac{2x^2+5x+11}{(2x-1)^2(x+1)} \equiv \frac{\frac{-7}{9}}{2x-1} + \frac{\frac{28}{3}}{(2x-1)^2} + \frac{\frac{8}{9}}{x+1}$

$\frac{-7}{9}(2x-1)^{-1} + \frac{28}{3}(2x-1)^{-2} + \frac{8}{9}(x+1)^{-1}$

$\frac{-7}{9}(2x-1)^{-1} = \frac{-7}{9}(-1+2x)^{-1} = \frac{7}{9}(1-2x)^{-1}$

$= \frac{7}{9}[1 + 2x + 4x^2]$

$\frac{28}{3}(2x-1)^{-2} = \frac{28}{3}(-1+2x)^{-2} = \frac{-28}{3}(1-2x)^{-2}$

$= \frac{-28}{3}[1 + 4x + 12x^2]$

$\frac{8}{9}(x+1)^{-1} = \frac{8}{9}(1+x)^{-1}$

$= \frac{8}{9}[1 + x + x^2]$

therefore $\frac{2x^2+5x+11}{(2x-1)^2(x+1)} \equiv \frac{7}{9}[1 + 2x + 4x^2] + \frac{-28}{3}[1 + 4x + 12x^2] + \frac{8}{9}[1 + x + x^2]$

$\frac{2x^2+5x+11}{(2x-1)^2(x+1)} = \frac{-23}{3} + \frac{-314}{9}x - 108x^2$

$X$

C) Find the percentage error made in using the series expansion in part B to estimate the value of f(0,05). Give your answer to 2sf

I got the wrong answer for the prior part so it I cant get it right

$X$