IGCSE Revision 7

1. Factorise

   (a) $6ax^3 - 21ax^2 + 9ax$. $3ax(2x-1)(x-3)$

   (b) $3x^3y - 3xy^3$. $3xy(x-y)(x+y)$

   (c) $2ax^3y - 2x^2y^2$. $2x^2y(ax-y)$

2. Solve

   (a) $\dfrac{3}{x-2} + \dfrac{4}{x-1} = 5$. $x = 3$ or $x = \frac{7}{5}$

   (b) $3\pi x^2 = 7\pi x + 6\pi$. $x = 3$ or $x = -\frac{2}{3}$

   (c) $\dfrac{x}{3} - \dfrac{2x-1}{4} = 3 - x + \dfrac{x-1}{2}$. $x = \frac{27}{4}$

3. Simplify $\dfrac{x+2}{\frac{3}{x-1} - \frac{1}{x+1}}$. $\frac{x^2-1}{2}$

4. Given $f(x) = \dfrac{3x}{2x-1}$ and $g(x) = \dfrac{1}{x+2}$.

   (a) Find $f^{-1}x$. $f^{-1} = \frac{x}{2x-3}$

   (b) Solve $\frac{2}{3} = g(x)$. $x = -\frac{1}{2}$

   (c) Find $fg(-\frac{1}{2})$. $fg(-\frac{1}{2}) = 6$

   (d) Find $gf(x)$ (fully simplified). $gf(x) = \frac{2x-1}{7x-2}$

5. What are the three inequalities which define the inside of the triangle with vertices $(2,1)$, $(2,-1)$, $(6,-1)$. $x > 2, y > -1, x + 2y < 4$

6. Find the equation of the tangent to the curve $y = x^3 - 3x^2 + x - 2$ when $x = 2$. Find also where this tangent intersects the x-axis. $y = x - 6, (6, 0)$

7. Find the coordinates of the point(s) on the curve $y = -\dfrac{1}{x} - 3x$ with gradient 1. $(\frac{1}{2}, -\frac{7}{2}), (-\frac{1}{2}, \frac{7}{2})$