IGCSE Revision 7

1. Factorise

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

   (b) $3x^3y - 3xy^3$. $\boxed{3xy(x-y)(x+y)}$

   (c) $2ax^3y - 2x^2y^2$. $\boxed{2x^2y(ax-y)}$

2. Solve

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

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

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

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

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

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

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

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

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

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

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. $\boxed{y = x - 6, (6, 0)}$

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