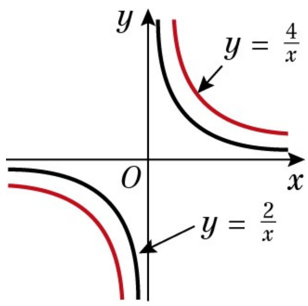
Exercise 4B

1 a For $x > 0$, $\frac{4}{x} > \frac{2}{x}$ (since $4 > 2$)

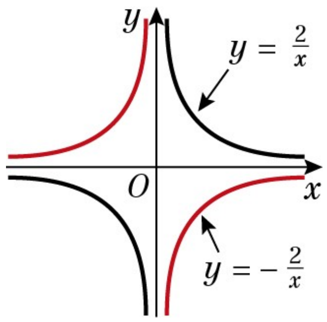
For $x < 0$, $\frac{4}{x} < \frac{2}{x}$

So $y = \frac{4}{x}$ is above $y = \frac{2}{x}$ in the first quadrant, and below in the third quadrant.



b For $x > 0$, $y = \frac{2}{x} > 0$ and $y = -\frac{2}{x} < 0$

For $x < 0$, $y = \frac{2}{x} < 0$ and $y = -\frac{2}{x} > 0$



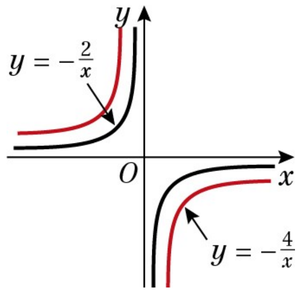
c Graphs are like $y = -\frac{1}{x}$ and so they exist in the second and fourth quadrants.

For $x > 0$, $-\frac{4}{x} < -\frac{2}{x}$

For $x < 0$, $-\frac{4}{x} > -\frac{2}{x}$

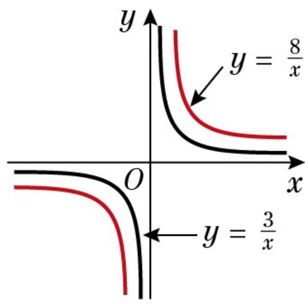
So $y = -\frac{4}{x}$ is above $y = -\frac{2}{x}$ in the second quadrant and below it in the fourth quadrant.

c



d For $x > 0$, $\frac{8}{x} > \frac{3}{x}$

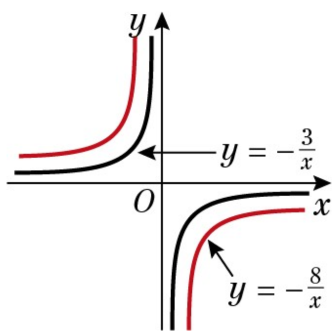
So $y = \frac{8}{x}$ is above $y = \frac{3}{x}$ in the first quadrant and below it in the third quadrant.



e For $x > 0$, $-\frac{8}{x} < -\frac{3}{x}$

For $x < 0$, $-\frac{8}{x} > -\frac{3}{x}$

So $y = -\frac{8}{x}$ is above $y = -\frac{3}{x}$ in the second quadrant and below it in the fourth quadrant.



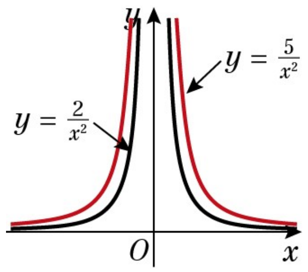
2 **a** $y = \frac{2}{x^2}$ and $y = \frac{5}{x^2}$

These are $y = \frac{k}{x^2}$ graphs, with $k > 0$.

x^2 is always positive and $k > 0$ so the y-values are all positive.

$\frac{5}{x^2} > \frac{2}{x^2}$ (since $5 > 2$)

So $y = \frac{5}{x^2}$ is above $y = \frac{2}{x^2}$.



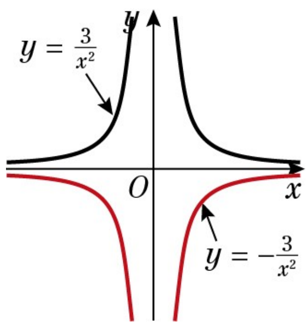
b $y = \frac{3}{x^2}$ and $y = -\frac{3}{x^2}$

$y = \frac{3}{x^2}$ is a $y = \frac{k}{x^2}$ graph, with $k > 0$.

x^2 is always positive and $k > 0$ so the y-values are all positive.

$y = -\frac{3}{x^2}$ is a $y = \frac{k}{x^2}$ graph, with $k < 0$.

x^2 is always positive and $k < 0$ so the y-values are all negative.



c $y = -\frac{2}{x^2}$ and $y = -\frac{6}{x^2}$

These are $y = \frac{k}{x^2}$ graphs, with $k < 0$.

x^2 is always positive and $k < 0$ so the y-values are all negative.

$-\frac{6}{x^2} < -\frac{2}{x^2}$ (since $-6 < -2$)

So $y = -\frac{6}{x^2}$ is below $y = -\frac{2}{x^2}$.