

Solutions

Each answer shows the steps, then the **result**.

2.1

- $\frac{dy}{dx} = -\frac{x}{y}$

2.2

- Set numerator $x = 0$; points $(0, 5)$ and $(0, -5)$

2.3

- Vertical where denominator $y = 0$, i.e. at $(\pm 5, 0)$ — where the curve meets the x -axis

3.1 C

- a horizontal tangent needs the numerator zero, $x - 1 = 0$, so $x = 1$

3.2

(a)

- $\frac{dy}{dx} = -\frac{2(1) + 2}{1 + 2(2)} = -\frac{4}{5}$

(b)

- Neither — the slope $-\frac{4}{5}$ is finite and non-zero

3.3

- $\frac{d^2y}{dx^2} = -\frac{25}{4^3} = -\frac{25}{64} < 0$; negative, so the curve is **concave down** at $(3, 4)$