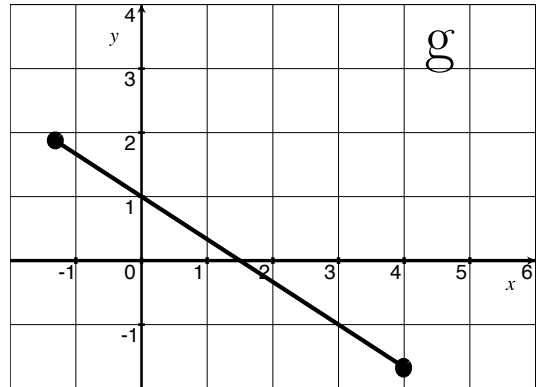
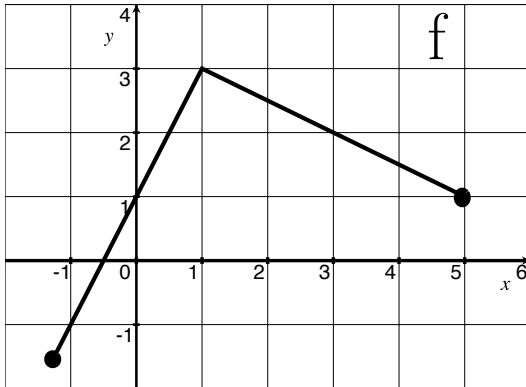


# Derivatives of Products & Quotients

While working in a group make sure you:

- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

1. Let  $f$  be the function graphed on the left and  $g$  be the function graphed on the right.



Estimate the following (if possible):

$$(f \cdot g)'(-1)$$

$$\frac{d}{dx}(fg)|_{x=0}$$

$$(fg)'(1)$$

$$(g \cdot f)'(2)$$

2. Find:

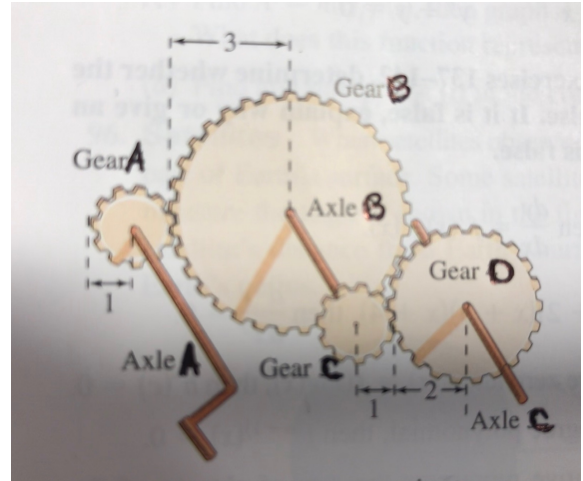
$$\frac{d}{dx} \left( \frac{f}{g} \right) |_{x=1}$$

$$\left( \frac{g}{f} \right)' (3)$$

# Chain Rule

3. Things we know about the gears:

- This is in 3D, the axles come out of the page towards us.
- Gear B & C are on the same axle.
- Circumference  $C$  is computed by  $2\pi r$  and  $r$  is in the picture.
  - $C_B = 3 * C_A \rightarrow??$
  - $C_D = 2C_C \rightarrow??$
- Let  $y = \#$  of rev/min. of Axle A
- Let  $u = \#$  of rev/min. of Axle B
- Let  $x = \#$  of rev/min. of Axle C



- Find  $\frac{dy}{du}$                                        $\frac{du}{dx}$                                        $\frac{dy}{dx}$

4. For each  $f$  defined below, find  $f'(x)$ .

$$f(x) = e^{x^5}$$

$$f(x) = \frac{1}{1 + x^3}$$

5. Let  $F = f(g(x))$  where  $f$  and  $g$  are graphed on the front of this Activity.

(a) Find  $F'(3)$ .

(b) Find the equation of the line tangent to  $F$  at  $x = 3$ .