

Exercise walk-through

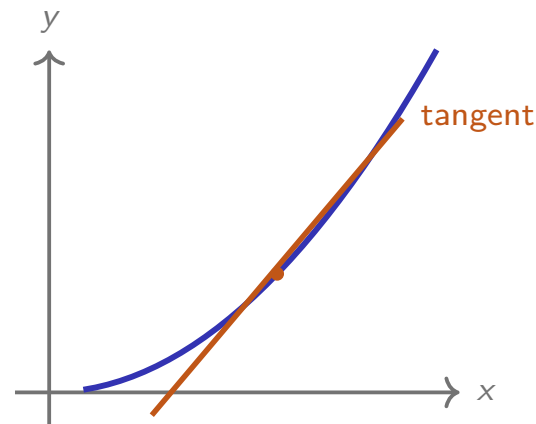
2.5

Applying the Power Rule

AP Calculus AB

What we will cover

- 1 Average vs instantaneous rate
- 2 The derivative as a limit
- 3 When a derivative exists
- 4 Basic derivative rules
- 5 Product & quotient rules
- 6 Trig, exp & log derivatives



The power rule

The **power rule** handles **any** real power:

$$\frac{d}{dx} x^r = r x^{r-1}.$$

Rewrite as a power **first**: $\frac{1}{x} = x^{-1}$,
 $\sqrt{x} = x^{1/2}$.

$$x^5 \rightarrow 5x^4$$

$$\frac{1}{x} = x^{-1} \rightarrow -x^{-2}$$

$$\sqrt{x} = x^{1/2} \rightarrow \frac{1}{2}x^{-1/2}$$

Unit 2 – key takeaways

1

The derivative

the limit of the secant slope – the tangent's gradient

2

Existence

differentiable $\Rightarrow$ continuous;
corners and vertical tangents fail

3

The rules

power, constant multiple, sum;
product and quotient

4

Building blocks

$\sin$, $\cos$, e^x , $\ln x$ – know them by heart

Exercises 2.1-2.3

2.1 State the power rule.

[1]

2.2 Differentiate x^5 .

[1]

2.3 Differentiate x^2 and x .

[2]

Exercises 2.1-2.3

2.1 State the power rule.

[1]

2.1

- $\frac{d}{dx}[x^n] = n x^{n-1}$

2.2 Differentiate x^5 .

[1]

2.2

- $5x^4$

2.3 Differentiate x^2 and x .

[2]

2.3

- $\frac{d}{dx}[x^2] = 2x; \frac{d}{dx}[x] = 1$

Exercise 3.1

3.1 $\frac{d}{dx}[x^n]$ equals

[1]

☐

A x^{n-1}

B $n x^{n-1}$

C $n x^n$

D $\frac{x^{n+1}}{n+1}$

Exercise 3.1

3.1 $\frac{d}{dx}[x^n]$ equals

[1]

☐

A x^{n-1}

B $n x^{n-1}$

C $n x^n$

D $\frac{x^{n+1}}{n+1}$

3.1 B

- $n x^{n-1}$.

Exercise 3.2

3.2 $\frac{d}{dx}[x^4]$ equals

[1]

☐

A $4x^3$

B x^3

C $4x^5$

D $3x^4$

Exercise 3.2

3.2 $\frac{d}{dx}[x^4]$ equals

[1]

☐

A $4x^3$

B x^3

C $4x^5$

D $3x^4$

3.2 A

- $4x^3$.

Exercise 3.3 (a)

3.3 Differentiate each.

(a) x^6 .

[1]

Exercise 3.3 (a)

3.3 Differentiate each.

(a) x^6 .

[1]

(a)

- $6x^5$

Exercise 3.3 (b)

3.3 Differentiate each.

(b) x .

[1]

Exercise 3.3 (b)

3.3 Differentiate each.

(b) x .

[1]

(b)

- 1

Exercise 3.3 (c)

3.3 Differentiate each.

(c) 7 (a constant).

[1]

Exercise 3.3 (c)

3.3 Differentiate each.

(c) 7 (a constant).

[1]

(c)

- 0