

## Week 11 Practice Quiz 2: Chain rule / motion

Key

Differentiate each function with respect to  $x$ .

1)  $y = \sec 2x^4$

$$6x^3 \sec 2x^4 \tan 2x^4$$

②  $f(x) = (5x^5 + 1) \sec(5x^4)$

$$(5x^5 + 1) \sec(5x^4) \tan(5x^4) \cdot 20x^3 + 25x^4 \sec(5x^4)$$

$$5x^3 \sec(5x^4) \left[ (5x^4 + 1) \tan(5x^4) (4) + 5x \right]$$

$$\left[ 4(5x^4 + 1) \tan(5x^4) + 5x \right]$$

$$\boxed{5x^3 \sec(5x^4) \left[ (20x^4 + 4) \tan(5x^4) + 5x \right]}$$

$$(3) \quad y = \frac{\cos(3x^4)}{4x^3 + 5}$$

$$\frac{(4x^3 + 5)(-\sin(3x^4) \cdot 12x^3 - 12x^2 \cos(3x^4))}{(4x^3 + 5)^2}$$

$$= \frac{-(48x^6 + 60x^3) \sin(3x^4) - 12x^2 \cos(3x^4)}{(4x^3 + 5)^2}$$

$$(4) \quad f(x) = \cos(2x^2) \sec(2x^2)$$

$$\cos(2x^2) \cdot \frac{1}{\cos(2x^2)} = 1$$

$$f'(x) = 0$$

A particle moves along a horizontal line. Its position function is  $s(t)$  for  $t \geq 0$ . For each problem, find the velocity function  $v(t)$ , the acceleration function  $a(t)$ , and the intervals of time when the particle is slowing down and speeding up. Defend your responses

5)  $s(t) = t^3 - 18t^2 + 81t$

$$s'(t) = 3t^2 - 36t + 81 \quad 3(t^2 - 12t + 27)$$

$$s''(t) = 6t - 36$$

$$0 = 6t - 36$$

$$6 = t$$

$$3(t-3)(t-9)$$

$$t=3$$

$$t=9$$

