Name: Richard

QUIZ 15

MATH 201
March 25, 2025

1. This problem involves the parametric curve $x = t^2 - \frac{1}{t}, \quad y = t^3 + t.$

(a) Find $\frac{dy}{dx}$.

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{3t^2+1}{2t+\frac{1}{t^2}} = \frac{\frac{3t^2+1}{1}}{\frac{2t^3+1}{t^2}}$$

$$= \frac{3t^2+1}{1} \cdot \frac{t^2}{2t^3+1} = \boxed{\frac{3t^4+t^2}{2t^3+1}}$$

(b) Find the slope of the tangent to the curve at the point where $t = 2$.

$$\left.\frac{dy}{dx}\right|_{t=2} = \frac{3\cdot 2^4 + 2^2}{2\cdot 2^3 + 1} = \boxed{\frac{52}{17}}$$

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1. This problem involves the parametric curve $x = t^2 - 1, \quad y = t^2 + \sqrt{t}$.

(a) Find $\frac{dy}{dx}$.

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{2t + \frac{1}{2\sqrt{t}}}{2t} = \frac{\frac{4t\sqrt{t} + 1}{2\sqrt{t}}}{\frac{2t}{1}}$$

$$= \frac{1}{2t} \cdot \frac{4t\sqrt{t} + 1}{2\sqrt{t}} = \boxed{\frac{4t\sqrt{t} + 1}{4t\sqrt{t}}}$$

(b) Find the slope of the tangent to the curve at the point where $t = 4$.

$$\left.\frac{dy}{dx}\right|_{t=4} = \frac{4 \cdot 4\sqrt{4} + 1}{4 \cdot 4\sqrt{4}} = \frac{32 + 1}{32} = \boxed{\frac{33}{32}}$$