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Quiz 3
(version for class workshop)

Cal I (S) (Maths 201–NYA)

NYA Cal I — Practice Quiz 3

1. True/False: (justify!) If $f(x)$ is differentiable:

   (a) $\dfrac{d}{dx}\left(\sqrt{f(x)}\right) = \dfrac{f'(x)}{2\sqrt{f(x)}}$

   (b) $\dfrac{d}{dx}\left(f(\sqrt{x})\right) = \dfrac{f'(x)}{2\sqrt{x}}$

2. Calculate y':

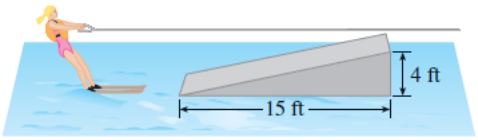
   (a) $y = 1/\sqrt[3]{x+\sqrt{x}}$

   (b) $y = \dfrac{(x^2+1)^4}{(2x+1)^3(3x-1)^5}$

   (c) $y = e^{\cos x} + \cos(e^x)$

3. A paper cup has the shape of a cone with height 10 cm and radius 3 cm (at the top). If water is poured into the cup at a rate of 2 cm^3/s, how fast is the water level rising when the water is 5 cm deep?

4. A waterskier is being towed over a triangular ramp 15 feet long (horizontally), 4 ft high at the far end (level with the water at the near end), at a speed of 30 ft/s. How fast is she rising (vertically) as she leaves the ramp? (Note: she is being pulled at a constant speed, so that speed is maintained as she goes up the ramp.)



5. Consider the astroid ("star-shaped") curve $x^{2/3} + y^{2/3} = a^{2/3}$ (for a constant a): show that the length of the portion of any tangent line cut off by the coordinates is constant (in fact, is a).