

Quiz 1

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1. $y(x) = x^{2r}$

$$y'(x) = 2rx^{2r-1}$$

$$y''(x) = 2r(2r-1)x^{2r-2}$$

$$x^2(2r)(2r-1)x^{2r-2} + x(2r)x^{2r-1} - x^{2r} = 0$$

$$(2r)(2r-1)x^{2r} + 2rx^{2r} - x^{2r} = 0$$

$$x^{2r}(2r(2r-1) + 2r - 1) = 0$$

$$x^{2r}(4r^2 - 2r + 2r - 1) = 0$$

$$x^{2r}(4r^2 - 1) = 0$$

$$x^{2r}(2r-1)(2r+1) = 0$$

$$r = \frac{1}{2} \quad r = -\frac{1}{2}$$

2.

$$\frac{dy}{dx} = \frac{x^2+1}{y^3}$$

$$y^3 dy = (x^2+1) dx$$

$$\frac{1}{4}y^4 = \frac{1}{3}x^3 + x + C$$

$$\frac{1}{4}(2^4) = \frac{1}{3}(0)^3 + (0) + C$$

$$\frac{1}{4}(16) = C$$

$$4 = C$$

$$\frac{1}{4}y^4 = \frac{1}{3}x^3 + x + 4$$

$$y^4 = 4\left(\frac{1}{3}x^3 + x + 4\right)$$

$$y = \pm \sqrt[4]{4\left(\frac{1}{3}x^3 + x + 4\right)}$$