Eric Nguyen
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40. $\frac{dy}{dx} = 11x^{10}y$

$$\int \frac{dy}{y} = 11 \int x^{10}\, dx \tag{1}$$
$$\ln|y| = x^{11} + C_1 \tag{2}$$
$$y = C_1 e^{x^{11}}, \text{ where } C_1 = \pm e^C \tag{3}$$

41. $\frac{dy}{dx} = \frac{2}{y}$

$$\int y\, dy = 2 \int dx \tag{4}$$
$$\frac{y^2}{2} = 2x + C_1 \tag{5}$$
$$y = \pm\sqrt{4x + C_1}, \text{ where } C_1 = 2C \tag{6}$$

42. $\frac{dy}{dx} = 4y; \quad y = 5$ when $x = 0$

$$\int \frac{dy}{y} = 4 \int dx \tag{7}$$
$$\ln|y| = 4x + C_1 \tag{8}$$
$$y = C_1 e^{4x} \tag{9}$$
$$C_1 = 5; y = 5e^{4x} \tag{10}$$

43. $\frac{dv}{dt} = 5v^{-2}; \quad v = 4$ when $t = 3$

$$\int v^2\, dv = 5 \int dt \tag{11}$$
$$\frac{v^3}{3} = 5t + C_1 \tag{12}$$
$$v = \sqrt[3]{15t + C_1} \tag{13}$$
$$C_1 = 4^3 - 15(3) = 19 \tag{14}$$
$$v = \sqrt[3]{15t + 19} \tag{15}$$

44. $y' = \frac{3x}{y}$

$$\frac{dy}{dx} = \frac{3x}{y} \tag{16}$$
$$\int y\, dy = 3 \int x\, dx \tag{17}$$
$$\frac{y^2}{2} = \frac{3x^2}{2} + C_1 \tag{18}$$
$$y = \pm\sqrt{3x^2 + C_1}, \text{ where } C_1 = 2C \tag{19}$$

45. $y' = 8x - xy$

$$\frac{dy}{dx} = x\,(8 - y) \tag{20}$$
$$\int \frac{dy}{8-y} = \int x\,dx \tag{21}$$
$$\ln|8 - y| = \frac{x^2}{2} + C_1 \tag{22}$$
$$y = C_1 e^{\frac{x^2}{2}} + 8 \tag{23}$$

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26. $\frac{dy}{dx} = 8x^7 y$

$$\int \frac{dy}{y} = 8\int x^7\,dx \tag{24}$$
$$\ln|y| = x^8 + C_1 \tag{25}$$
$$y = C_1 x^8 \tag{26}$$

27. $\frac{dy}{dx} = \frac{9}{y}$

$$\int y\,dy = 9\int dx \tag{27}$$
$$\frac{y^2}{2} = 9x + C_1 \tag{28}$$
$$y = \sqrt{18x + C_1} \tag{29}$$

28. $\frac{dy}{dt} = 6y; \quad y = 11$ when $t = 0$

$$\int \frac{dy}{y} = 6\int dt \tag{30}$$
$$\ln|y| = 6t + C_1 \tag{31}$$
$$y = C_1 e^{6t} \tag{32}$$
$$C_1 = 11; y = 11e^{6t} \tag{33}$$

29. $y' = 5x^2 - x^2 y$

$$\frac{dy}{dx} = x^2\,(5 - y) \tag{34}$$
$$\int \frac{dy}{5-y} = \int x^2\,dx \tag{35}$$
$$\ln|5 - y| = \frac{x^3}{3} + C_1 \tag{36}$$
$$y = \pm C_1 e^{\frac{x^3}{3}} + 5 \tag{37}$$

30. $\frac{dv}{dt} = 2v^{-3}$

$$\int v^3\,dt = 2\int dt \tag{38}$$

$$\frac{v^4}{4} = 2t + C_1 \tag{39}$$

$$v = \sqrt[4]{8t + C_1} \tag{40}$$

31. $y' = 4y + xy$

$$\frac{dy}{dx} = y\,(4 + x) \tag{41}$$

$$\int \frac{dy}{y} = 4\int dx + \int x\,dx \tag{42}$$

$$\ln|y| = 4x + \frac{x^2}{2} + C_1 \tag{43}$$

$$y = C_1 e^{4x + \frac{x^2}{2}} \tag{44}$$