$\frac{dB}{dt} = \frac{1}{5}(100-B)$ $\quad B(0)=20$

ⓐ 40 grams → weight → Plug in for B $\left.\frac{dB}{dt}\right|_{B=40} = \frac{1}{5}(100-40) = 12$

70 grams → Plug in for B $\left.\frac{dB}{dt}\right|_{B=70} = \frac{1}{5}(100-70) = 6$

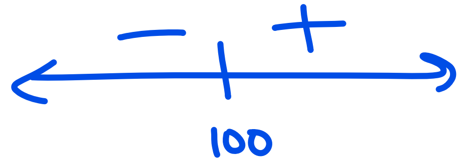
faster when B = 40 since 12 > 6

ⓑ $\frac{d^2B}{dt^2}$ $\quad \frac{dB}{dt} = \frac{1}{5}(100-B)$

$\frac{d}{dt}\frac{dB}{dt} = \frac{d}{dt}\left(20 - \frac{1}{5}B\right)$

$\frac{d^2B}{dt^2} = -\frac{1}{5}\frac{dB}{dt}$

$\boxed{\frac{d^2B}{dt^2} = -\frac{1}{5}\cdot\frac{1}{5}(100-B)}$



if B = 100, $\frac{d^2B}{dt^2} = 0$

our B(t) is CCDown for B<100 and the pic changes

concavity before B reaches 100

ⓒ $\frac{dB}{dt} = \frac{1}{5}(100-B)$

$\int \frac{dB}{100-B} = \int \frac{1}{5}\, dt$

$\frac{1}{-1}\ln|100-B| = \frac{1}{5}t + C$

$-1\ln|100-20| = \frac{1}{5}(0) + C$

$-\ln 80 = C$

$\frac{-\ln|100-B|}{-1} = \frac{\frac{1}{5}t - \ln 80}{-1}$

$e^{\ln|100-B|} = e^{-\frac{1}{5}t + \ln 80}$

$100 - B = e^{-\frac{1}{5}t + \ln 80}$

$-B = e^{-\frac{1}{5}t + \ln 80} - 100$

$\boxed{B = -e^{-\frac{1}{5}t + \ln 80} + 100}$

$$\frac{dy}{dx} = \left(1 - \frac{2}{x^2}\right)(y-1) \qquad f(1)=2$$

ⓐ $$\left.\frac{dy}{dx}\right|_{(1,2)} = \left(1 - \frac{2}{1^2}\right)(2-1) = (-1)(1) = \boxed{-1}$$

ⓒ $$\int \frac{dy}{y-1} = \int \left(1 - \frac{2}{x^2}\right) dx \qquad \left(-\frac{2}{x^2} \to -2x^{-2}\right) \qquad f(1)=2$$

$$\ln|y-1| = x - \frac{2x^{-1}}{-1} + c$$

$$\ln|2-1| = 1 + \frac{2}{1} + c$$

$$0 = 3 + c$$

$$\boxed{c = -3}$$

$$e^{\ln|y-1|} = e^{x + 2x^{-1} - 3}$$

$$y - 1 = e^{x + \frac{2}{x} - 3}$$

$$\boxed{y = e^{x + \frac{2}{x} - 3} + 1}$$