1. $\int_0^1 9(x-1)^8(bx-1)\,dx, \quad b=7$

Note: You may have gotten a different b-value here. But the steps are the same!

Let's do integration by parts:

$u = bx-1$ $\qquad dv = (x-1)^8\,dx$

$du = b\,dx$ $\qquad v = \int (x-1)^8\,dx = \int w^8\,dw = \frac{1}{9}(x-1)^9$

$w = x-1$, $dw = dx$

$$9\int_0^1 (x-1)^8(bx-1)\,dx = 9(bx-1)\left(\tfrac{1}{9}(x-1)^9\right)\Big|_0^1 - \frac{b}{9}\int_0^1 (x-1)^9\,dx$$

$$= 9\left[(bx-1)\left(\tfrac{1}{9}(x-1)^9\right) - \frac{b}{9}\left(\tfrac{1}{10}(x-1)^{10}\right)\right]_0^1$$

$$= 9\Big[\underbrace{\left((b-1)\left(\tfrac{1}{9}(0)^9\right) - \frac{b}{9}\left(\tfrac{1}{10}(0)^{10}\right)\right)}_{=0} - \left((-1)\left(\tfrac{1}{9}(-1)^9\right) - \frac{b}{9}\left(\tfrac{1}{10}(-1)^{10}\right)\right)$$

$$= 9\left[-\left((-1)\left(\tfrac{1}{9}(-1)\right) - \frac{b}{9}\left(\tfrac{1}{10}\right)\right)\right]$$

$$= 9\left(-\frac{1}{9} + \frac{b}{90}\right)$$

$$= 9\left(\frac{b-10}{90}\right)$$

using $b=7$ $\rightarrow$ $= \frac{7-10}{10}$

$$= -\frac{3}{10}$$

2. $F(x) = \int_{-1}^{x} (t-2)\,dt$. Find $F'(5)$.

By the Fundamental Theorem of Calculus,

$F'(x) = x - 2$. So, $F'(5) = 5 - 2 = 3$.