5) $w = x^2 y$

$\frac{dx}{dt} = -1$ $\quad \frac{dy}{dt} = 4$ $\quad x = 6$

$y = 20$

$$\frac{dw}{dt} = 2x \frac{dx}{dt} y + x^2 \cdot \frac{dy}{dt}$$

$$\frac{dw}{dt} = 2(6)(-1)(20) + (6)^2(4)$$

$$= -240 + 144$$

$$= -96$$

6.) $y = x^2 - 2x$ $u = 2x + 1$

$$\frac{dy}{du} = \frac{dy}{dx}\,\frac{dx}{du}$$

$$\frac{dy}{dx} = 2x - 2 \qquad \frac{du}{dx} = 2$$

$$\frac{dy}{du} = (2x-2)\left(\frac{1}{2}\right) = x - 1$$

4) a) $g'(x) = 2 + f(x)$

b) $g'(x) = 2 + f(x)$

$g''(x) = f'(x)$

$g''(4) = f'(4) = \frac{-6}{6} = -1$

$g''(-2)$ does not exist

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c.) $g''(x) < 0$ if ccdown

$f'(x) < 0$ $(-2,0)$ and $(2,8)$

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d.) $h(x) = g(x^3+1)$

$h'(x) = g'(x^3+1) \cdot (3x^2)$

$h'(1) = g'(2)\ (3) = (2+f(2))(3) = (2+3)(3) = 15$

5.) $x(t) = 5t^3 - 9t^2 + 7$

ⓐ $x'(t) = v(t) = 15t^2 - 18t$

$x'(1) = 15 - 18 = -3$

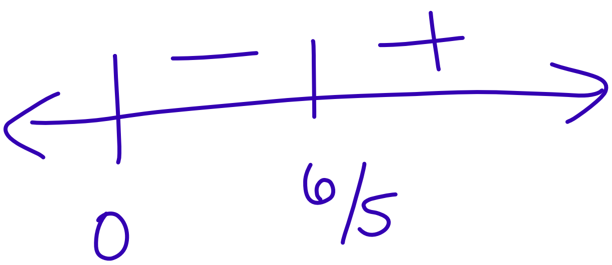
At $t=1$, particle x is moving left since $x'(1) < 0$

ⓑ $x'(t) = 15t^2 - 18t$

$0 = 3t(5t - 6)$

$t = 0$, $6/5$

at $t = 6/5$, x is farthest left b/c $x'(t)$ changes $-$ to $+$



ⓒ $x(t) = 5t^3 - 9t^2 + 7$ $\quad y(t) = 7t + 3$

$y'(t) = 7$

$A = \frac{1}{2} x(t) y(t)$

$$\frac{dA}{dt} = \frac{1}{2} x(t) y'(t) + \frac{1}{2} x'(t) y(t)$$

$$\left.\frac{dA}{dt}\right|_{t=1} = \frac{1}{2}(3)(7) + \frac{1}{2}(-3)(10)$$

$$= \frac{21}{2} - \frac{30}{2}$$

$$= -\frac{9}{2}$$