

10.4 #57

tangent line at $x=2$

$$f(x) = x(4-x)^3$$

$$f'(x) = F'S + FS' \quad \text{Product Rule}$$

$$f'(x) = 1(4-x)^3 + x(-3(4-x)^2)$$

$$= (4-x)^3 - 3x(4-x)^2$$

$$= (4-x)^2((4-x) - 3x)$$

$$= (4-x)^2(4-4x)$$

$$= 4(4-x)^2(1-x)$$

$$f'(2) = 4(4-2)^2(1-2)$$

$$= 4(4)(-1) = -16 = m$$

$$f(2) = 2(4-2)^3 = 2(8) = 16$$

So point $(2, 16)$ has slope -16

$$(y - y_0) = -16(x - x_0)$$

$$y - 16 = -16(x - 2) = -16x + 32$$

$$\boxed{y = -16x + 48}$$

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$$F = x$$

$$F' = 1$$

$$S = (4-x)^3 \quad \text{Chain rule}$$

$$S' = H'(G(x))G'(x)$$

$$H(u) = u^3$$

$$H'(u) = 3u^2$$

$$u = G(x) = 4-x$$

$$G'(x) = -1$$

$$S' = 3(4-x)^2(-1)$$

Use results in Product Rule