March 17

How do you take the derivative using the chain rule?
When do you need to use the chain rule?

March 17

Students will verbally explain how to find the derivative of a definite integral
(using the words:
chain rule, derivative, function, bound...)

1. $f(x) = (10 + 2x)^5$

2. $h(x) = (3x - 5)^2$

3. $g(t) = (3t^2 + 18)^4$

4. $p(y) = (3y - y^2)^3$

5. $S(w) = (2w + 1)^3$

6. $g(r) = (5r - 4)^{-2}$

7. $n(d) = \dfrac{1}{(7d + d^3)^7} = (7d + d^3)^{-7}$

8. $w(b) = (4b^3 + 2b^2 - b^{-1})^3$

9. $s(k) = \sqrt{(2k + k^2)}$

10. $q(a) = \sqrt[5]{(4a^3)}$

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1) $F(x^2 + 5x)$

2) $G(\sin(x))$

3) $H(e^x + \tan(x))$

4) $F\left(\dfrac{x^3}{6}\right) = F\left(\frac{1}{6}x^3\right) \rightarrow F'\left(\frac{1}{6}x^3\right)\left(\frac{3}{6}x^2\right)$ ($\frac{1}{2}x^2$)

5) $M\left(5x - \dfrac{1}{x^2}\right) = M(5x - x^{-2}) \rightarrow M'(5x - x^{-2})(5 + 2x^{-3})$ ($\frac{2}{x^3}$)

6) $P(\cot(x) + 6x^4) \rightarrow P'(\cot x + 6x^4)(-\csc^2 x + 24x^3)$

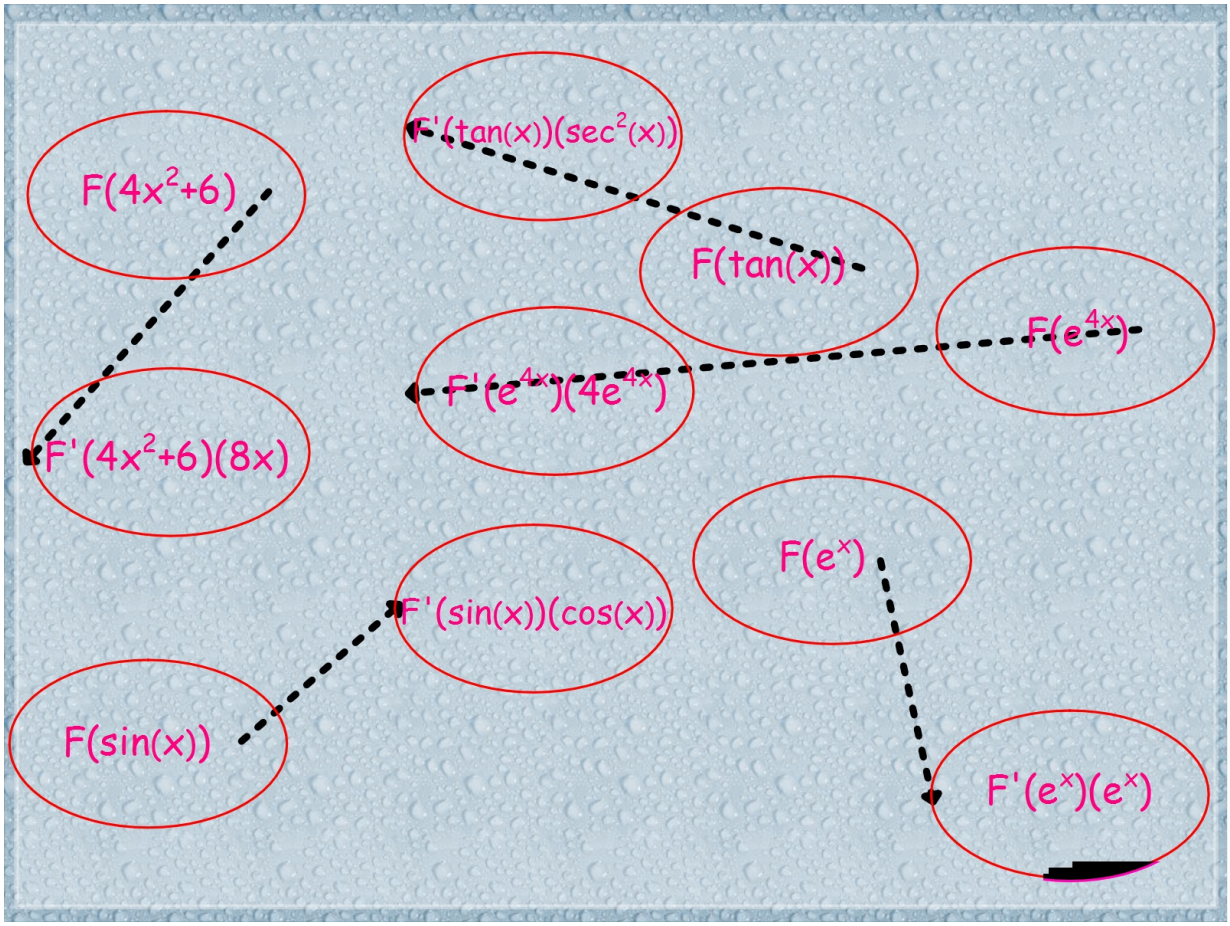
7) $F(\ln(x) + 5e^x)$

8) $N(x^6 - 7x^2 + \sin(x))$

9) $F\left(4^x - x^{2/3}\right)$

10) $F\left(\dfrac{x^4}{2} - \dfrac{x+3}{x^2-7}\right)$ ($\rightarrow \frac{1}{2}x^4$)

$F'\left(\frac{x^4}{2} - \frac{x+3}{x^2-7}\right)\left(2x^3 - \frac{1(x^2-7) - 2x(x+3)}{(x^2-7)^2}\right)$



$$\frac{d}{dx}\left(\int_{7x}^{x^2} e^{\cos t}\,dt\right)$$

$$\frac{d}{dt}(?) = e^{\cos t} = F'(t)$$

$$? = F(t)$$

$$\frac{d}{dx}\left(\int_{7x}^{x^2} e^{\cos t}\,dt\right) = \frac{d}{dx}\left(F(t)\Big|_{7x}^{x^2}\right)$$

$$= \frac{d}{dx}\left(F(x^2) - F(7x)\right)$$

$$= F'(x^2)(2x) - F'(7x)(7)$$

$$= e^{\cos x^2}(2x) - e^{\cos 7x}(7)$$

$$\frac{d}{dx}\left(\int_{3+x}^{\cos x} \sqrt{e^t+10}\, dt\right)$$

$$\sqrt{e^{\cos x}+10}\,(-\sin x) - \sqrt{e^{3+x}+10}\,(1)$$

Fundamental Theorem of Calculus (Part 2)