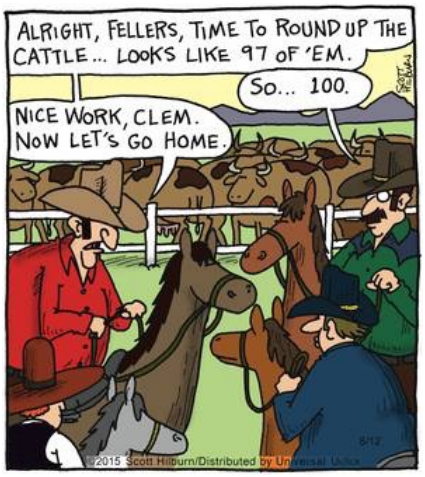
Wednesday, September 28, 2016

New Seats
New Calendar
Opener Below
4.1 What is the Chain Rule?

Cumulative moved to next Wednesday, 10/5!!!



Opener: Decompose each function. Label the inside function as g(x) and the outside function as f(x).

① $y = (2x)^3$
$g(x) = 2x$
$f(x) = x^3$

② $y = (3x-5)^2$
$g(x) = 3x-5$
$f(x) = x^2$

③ $y = \sin^2 x = (\sin x)^2$
$g(x) = \sin x$
$f(x) = x^2$

④ $y = \cos(5x)$
$g(x) = 5x$
$f(x) = \cos x$

Find derivative for #1, 2, 3 (old ways)

① $y = 8x^3$
$\frac{dy}{dx} = 24x^2$

② $y = 9x^2 - 30x + 25$
$\frac{dy}{dx} = 18x - 30$

③ $y = \sin x \cdot \sin x$
$\frac{dy}{dx} = \sin x \cdot \cos x + \cos x \cdot \sin x$
$= 2\sin x \cos x$

④ $y = \cos(5x)$
$\frac{dy}{dx} = -\sin(5x) \cdot 5$
$= -5\sin(5x)$

$= 3(2x)^2 \cdot 2$
$= 24x^2$

$= 2(3x-5) \cdot 3$
$= 18x - 30$

Chain Rule
If $y = f(g(x))$, then $y' = f'(g(x)) \cdot g'(x)$

① $y = (2x-1)^3$
$\frac{dy}{dx} = 3(2x-1)^2 \cdot 2$
$= 6(4x^2 - 4x + 1)$
$= 24x^2 - 24x + 6$

② $y = \cos(x^2+2x)$
$\frac{dy}{dx} = -\sin(x^2+2x) \cdot (2x+2)$
$= -(2x+2)\sin(x^2+2x)$

③ $\frac{d}{dx}\frac{1}{(3x+1)^2} = \frac{d}{dx}(3x+1)^{-2} = -2(3x+1)^{-3} \cdot (3)$
$= \frac{-6}{(3x+1)^3}$

(4) $\frac{d}{dx}\cos(\sin x) = -\sin(\sin x)\cdot\cos x = -\cos x \sin(\sin x)$

(5) $\frac{d}{dx}\underbrace{\sec 2\theta}_{u}\cdot\underbrace{\tan 2\theta}_{v}$ ① Product Rule ② Chain Rule

$u \quad v' \qquad u' \quad v$

$\sec 2\theta\cdot\sec^2 2\theta\cdot 2 + \sec 2\theta\tan 2\theta\cdot 2\cdot\tan 2\theta$

$2\sec^3 2\theta + 2\sec 2\theta\tan^2 2\theta$