MA 16010 Quiz 6 (Lessons 12, 13)

Write your name, section number (399 for 8:30, 418 for 9:30), and quiz number on the top of your quiz, **front and back.**

You may use a one–line calculator.

Compute

1. $f'(x)$ when
$$f(x) = e^{3x}\sin(2x+5)\ ,$$

2. $f''(x)$ when
$$f(x) = \ln(x+3).$$

1. $f'(x) = \frac{d}{dx}[e^{3x}]\cdot\sin(2x+5) + e^{3x}\cdot\frac{d}{dx}[\sin(2x+5)]$ (product rule)

$= e^{3x}\cdot 3\cdot\sin(2x+5) + e^{3x}\cdot\cos(2x+5)\cdot 2$ (chain rule)

$= e^{3x}(3\sin(2x+5) + 2\cos(2x+5))$

2. $f'(x) = \frac{1}{x+3}\cdot\frac{d}{dx}[x+3] = \frac{1}{x+3}$

$f''(x) = \frac{d}{dx}\left[\frac{1}{x+3}\right] = \frac{d}{dx}\left[(x+3)^{-1}\right] = (-1)\cdot(x+3)^{-2}\cdot\frac{d}{dx}[x+3]$ ($\frac{d}{dx}[x+3] = 1$)

$= -\frac{1}{(x+3)^2}$ (or use the quotient rule here)

$\frac{d}{dx}[x^{-1}] = (-1)x^{-2}$

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