1. Find the derivative of each of the following functions:

a. $f(x) = (4x+1)^3(5x+3)^{-2}$

$$f'(x) = 3(4x+1)^2(4)\cdot(5x+3)^{-2} + (4x+1)^3\cdot\left(-2(5x+3)^{-3}(5)\right)$$

b. $g(x) = (3x^2-6x+6)e^{-3x}$

$$g'(x) = (6x-6)e^{-3x} + (3x^2-6x+6)\cdot e^{-3x}(-3)$$

c. $h(x) = \frac{9e^{5x}}{8x-3}$

$$h'(x) = \frac{(8x-3)9e^{5x}(5) - 9e^{5x}(8)}{(8x-3)^2}$$

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

$$f'(x) = (5^x \ln 5)(x^2+1) + 5^x(2x)$$

e. $q(x) = \ln(\ln(12x))$

$$q'(x) = \frac{1}{\ln(12x)} \cdot \frac{1}{12x} \cdot 12$$

f. $p(x) = e^{x\sqrt{5x-16}}$

$$p'(x) = e^{x\sqrt{5x-16}} \left((1)\sqrt{5x+16} + x \cdot \frac{1}{2}(5x-6)^{-1/2}(5) \right)$$

g. $f(x) = e^{e^x}$

$$f'(x) = e^{e^x} \cdot e^x$$

h. $h(x) = \pi^{e^{2\pi}x}$

$$h'(x) = \pi^{e^{2\pi}}$$