More problems for section 3.2 & 3.3 of *Calculus, Early Transcendentals* by James Stewart, 8e.

The derivative of a product of two or more differentiable functions is given by the rules

$$\begin{aligned}\frac{d}{dx}(fg) &= \frac{df}{dx}g + f\frac{dg}{dx}\\ \frac{d}{dx}(fgh) &= \frac{df}{dx}gh + f\frac{dg}{dx}h + fg\frac{dh}{dx}\\ \frac{d}{dx}(fgh\xi) &= \frac{df}{dx}gh\xi + f\frac{dg}{dx}h\xi + fg\frac{dh}{dx}\xi + fgh\frac{d\xi}{dx}\end{aligned}$$

1. Find the derivative of the given function.

   a. $xe^x \tan x$ b. $x \sin x \sec x$ c. $x \sin x \tan x$ d. $(x^2+1)e^x \csc x$

   e. $e^x(\sin x + 1)(\cot x - \tan x)$ f. $(x+2)(x^2-2x+4)$ g. $\sin x \cot x$ h. $\sec x^2 \cos x^2$

2. Use the table of values to evaluate the derivative of the given function at $x = 0$.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
0	2	3	-4	5

   a. $f(x)g(x)$ b. $f(x)g(x)\big(f(x)+g(x)\big)$

   c. $\cos x f(x)g(x)$ d. $(x^2+1)(f(x)+e^x)(g(x)-2\tan x)$

Answers

1a. $e^x \tan x + xe^x \tan x + xe^x \sec^2 x$ 1b. $\sin x \sec x + x \cos x \sec x + x \sin x \sec x \tan x$ 1c. $\sin x \tan x + x \cos x \tan x + x \sin x \sec^2 x$
1d. $2xe^x \csc x + (x^2+1)e^x \csc x - (x^2+1)e^x \csc x \cot x$ 1e. $e^x(\sin x+1)(\cot x - \tan x) + e^x \cos x(\cot x - \tan x) - e^x(\sin x+1)(\csc^2 x + \sec^2 x)$
1f. $3x^2$ 1g. $-\sin x$ 1h. 0 2a. -2 2b. -60 2c. -2 2d. -7