Suppose that functions f and g and their derivatives have the following values at x = 2 and x = 3.

x	f(x)	g(x)	f '(x)	g '(x)
2	8	2	1/3	-3
3	3	-4	2π	5

Evaluate the derivatives with respect to x

A) 2f(x) at x = 2

$$\frac{d}{dx}\left(2f(x)\right) = 2f'(x)$$
$$= 2f'(2)$$
$$= 2\left(\frac{1}{3}\right)$$
$$= \frac{2}{3}$$

B) f(x) + g(x) at x = 3

$$\frac{d}{dx}\left(f(x)+g(x)\right) = f'(x)+g'(x)$$
$$= f'(3)+g'(3)$$
$$= 2\pi + 5$$

C) f(x)g(x) at x = 3

C) $f(x)g'(x) + g(x)f'(x)$
$f(3)g'(3)+g(3)f'(3)$
$(3)(5) + (-4)(2\pi)$
$15 - 8\pi$

D) $\frac{f(x)}{g(x)}$ at x = 2

$$\frac{24 + \frac{2}{3}}{(2)^2} = \frac{24\frac{2}{3}}{4}$$
$$= \frac{\left(\frac{74}{3}\right)}{4}$$
$$= \frac{74}{12}$$

$\frac{d}{dx}\left(\sin(5x)\right)$ $\cos(5x)\cdot 5$	*E)* $f(g(x))$ at $x=2$ $\frac{d}{dx}\left(f(g(x))\right) = f'(g(x))\cdot g'(x)$ $= f'(g(2))\cdot g'(2)$ $= f'(2)\cdot g'(2)$ $= \frac{1}{3}\cdot(-3)$ *F)* $\sqrt{f(x)}$ at $x=2$ $\frac{d}{dx}\sqrt{f(x)} = \frac{d}{dx}\left(f(x)\right)^{1/2}$ $\frac{1}{2}\left[f(x)\right]^{-1/2}\cdot f'(x)$ $\boxed{\frac{1f'(x)}{2\sqrt{f(x)}}}$ *G)* $\frac{1}{g^2(x)}$ at $x=3$ $\frac{d}{dx}\left[\frac{1}{g^2(x)}\right] = \frac{d}{dx}\left[g(x)\right]^{-2}$ $= -2\left[g(x)\right]^{-3}\cdot g'(x) = \frac{-2g'(x)}{\left[g(x)\right]^3}$ *F)* $\sqrt{f^2(x)+g^2(x)}$ at $x=2$ $\frac{d}{dx}\left(\sqrt{f^2(x)+g^2(x)}\right) = \frac{d}{dx}\left(\left[f(x)\right]^2+\left[g(x)\right]^2\right)^{1/2}$ $\frac{1}{2}\left(\left[f(x)\right]^2+\left[g(x)\right]^2\right)^{-1/2}\cdot\left[2f(x)\cdot f'(x) + 2g(x)\cdot g'(x)\right]$ $\frac{f(x)\cdot f'(x)+g(x)g'(x)}{\sqrt{f^2(x)+g^2(x)}}$