Product rule
AP Calculus AB

1. If $y = x^2 e^x$, then $\frac{dy}{dx} =$

(A) $2xe^x$ (B) $x\left(x + 2e^x\right)$ (C) $xe^x\left(x + 2\right)$

(D) $2x + e^x$ (E) $2x + e$

8. Let f and g be differentiable functions with the following properties:

(i) $g(x) > 0$ for all x
(ii) $f(0) = 1$

If $h(x) = f(x)g(x)$ and $h'(x) = f(x)g'(x)$, then $f(x) =$

(A) $f'(x)$ (B) $g(x)$ (C) e^x (D) 0 (E) 1

14. If $f(x) = x^{\frac{1}{3}}\left(x-2\right)^{\frac{2}{3}}$ for all x, then the domain of f' is

(A) $\left\{x \middle| x \neq 0\right\}$ (B) $\left\{x \middle| x > 0\right\}$ (C) $\left\{x \middle| 0 \leq x \leq 2\right\}$

(D) $\left\{x \middle| x \neq 0 \text{ and } x \neq 2\right\}$ (E) $\left\{x \middle| x \text{ is a real number}\right\}$

448. Suppose that $u(x)$ and $v(x)$ are differentiable functions of x and that

$$u(1) = 2, \qquad u'(1) = 0, \qquad v(1) = 5, \qquad \text{and} \qquad v'(1) = -1.$$

Find the values of the following derivatives at $x = 1$.

a) $\frac{d}{dx}(uv)$ d) $\frac{d}{dx}(7v - 2u)$