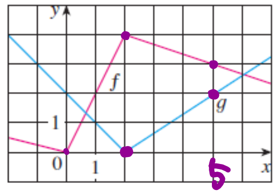
47. If f and g are the functions whose graphs are shown, let $u(x) = f(x)g(x)$ and $v(x) = f(x)/g(x)$.

(a) Find $u'(1)$. (b) Find $v'(5)$.



$$v' = \frac{f'g - g'f}{g^2}$$

$$v'(5) = \frac{f'(5)g(5) - g'(5)f(5)}{(g(5))^2}$$

$$= \frac{\left(-\frac{1}{3}\right)(2) - \left(\frac{2}{3}\right)(3)}{2^2}$$

$$= \frac{-\frac{2}{3} - \frac{6}{3}}{4}$$

$$= \frac{-\frac{8}{3}}{4} = -\frac{2}{3}$$

15. $y = \dfrac{t^2 + 2}{t^4 - 3t^2 + 1}$

$$y' = \frac{(2t)(t^4 - 3t^2 + 1) - (4t^3 - 6t)(t^2 + 2)}{(t^4 - 3t^2 + 1)^2}$$

$$= \frac{2t^5 - 6t^3 + 2t - (4t^5 + 2t^3 - 12t)}{(t^4 - 3t^2 + 1)^2}$$

$$= \frac{-2t^5 - 8t^3 + 14t}{(t^4 - 3t^2 + 1)^2}$$

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

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

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

$y' = f'g + g'f$
$(2x)(e^x) + (e^x)(x^2)$
$xe^x(2+x)$

2. If $f(x) = (2x+1)^4$, then the 4th derivative of $f(x)$ at $x = 0$ is

(A) 0 (B) 24 (C) 48 (D) 240 (E) 384

$f' = 4(2x+1)^3 \cdot 2 = 8(2x+1)^3$

$f'' = 24(2x+1)^2 \cdot 2 = 48(2x+1)^2$

$f''' = 96(2x+1) \cdot 2 = 192(2x+1)^1$

$f^{[4]} = 192(2x+1)^0 \cdot 2 = 384$

$\underline{4!} \cdot 2^4 = \underline{24} \cdot 16 = 384$

$4 \cdot 3 \cdot 2 = {}_4P_3$

6. If $f(x) = x$, then $f'(5) =$

(A) 0 (B) $\frac{1}{5}$ (C) 1 (D) 5 (E) $\frac{25}{2}$

$f'(x) = 1(x)^0 = 1$

6. If $f(x) = \dfrac{x-1}{x+1}$ for all $x \neq -1$, then $f'(1) =$

(A) -1 (B) $-\frac{1}{2}$ (C) 0 (D) $\frac{1}{2}$ (E) 1

$f'(x) =$