WS 27

Derivatives Using Tables

1) a) $h(x) = f(x) + g(x)$

$h'(x) = f'(x) + g'(x)$

$h'(2) = f'(2) + g'(2)$

$= -1 + \frac{3}{2}$

$= \boxed{\frac{1}{2}}$

b) $s(x) = f(x) - g(x)$

$s'(x) = f'(x) - g'(x)$

$s'(3) = f'(3) - g'(3)$

$= -1 - 1$

$= \boxed{-2}$

c) $p(x) = f(x) \cdot g(x)$

$p'(x) = f(x) \cdot g'(x) + g(x) \cdot f'(x)$

$p'(4) = f(4) \cdot g'(4) + g(4) \cdot f'(4)$

$= (2)(1) + (5)(-1)$

$= \boxed{-3}$

d) $q(x) = \frac{g(x)}{f(x)}$

$q'(x) = \frac{f(x) \cdot g'(x) - g(x) \cdot f'(x)}{[f(x)]^2}$

$q'(5) = \frac{f(5) \cdot g'(5) - g(5) \cdot f'(5)}{[f(5)]^2}$

$q'(5) = \frac{(1)(-\frac{1}{2}) - (6)(0)}{[1]^2}$

$= \boxed{-\frac{1}{2}}$

e) $c(x) = [f(x)]^2$

$c'(x) = 2(f(x)) \cdot f'(x)$

$c'(2) = 2 f(2) \cdot f'(2)$

$= 2(4)(-1)$

$= \boxed{-8}$

f) $m(x) = f(g(x))$

$m'(x) = f'(g(x)) \cdot g'(x)$

$m'(6) = f'(g(6)) \cdot g'(6)$

$= f'(4) \cdot g'(6)$

$= (-1)(-2)$

$= \boxed{2}$

2) a) $h(x) = f(g(x))$

$h'(x) = f'(g(x)) \cdot g'(x)$

$h'(4) = f'(g(4)) \cdot g'(4)$

$= f'(2) \cdot g'(4)$

$= (-3)(\frac{2}{5})$

$= \boxed{-\frac{6}{5}}$

b) $p(x) = g(f(x))$

$p'(x) = g'(f(x)) \cdot f'(x)$

$p'(3) = g'(f(3)) \cdot f'(3)$

$= g'(4) \cdot f'(3)$

$= (\frac{2}{5})(-2)$

$= \boxed{-\frac{4}{5}}$

3) $k(x) = \frac{f(x)}{g(x)}$

$k'(x) = \frac{g(x)\cdot f'(x) - f(x)\,g'(x)}{[g(x)]^2}$

$k'(3) = \frac{g(3)\cdot f'(3) - f(3)\,g'(3)}{[g(3)]^2}$

$= \frac{(2)(5) - (-1)(-2)}{(2)^2}$

$= \boxed{2}$

4) a) $g(x) = x^2 \cdot f(x)$

point

$g(4) = 16 \cdot f(4)$

$= 16 \cdot 5$

$= 80$

$(4, 80)$

slope

$g'(x) = x^2 \cdot f'(x) + 2x\, f(x)$

$g'(4) = 16 \cdot f'(4) + 8\, f(4)$

$= 16(4) + 8(5)$

$= 104$

Tangent: $y - 80 = 104(x - 4)$

b) $h(x) = \frac{f(x)}{x-5}$

slope

$h'(x) = \frac{(x-5)\cdot f'(x) - f(x)(1)}{(x-5)^2}$

point

$h(4) = \frac{f(4)}{-1} = -5$

$h'(4) = \frac{(-1)\cdot f'(4) - f(4)}{1}$

$= \frac{-4 - 5}{1}$

$= -9$

Tangent: $y + 5 = -9(x - 4)$