

1. (3+4+4+4 points) Suppose that  $f$  and  $g$  are differentiable functions with values given by the following table:

$x$	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
2	2	5	-1	-6
4	4	2	12	-2

(a) Find the derivative of  $n(x) = \pi^\pi + e^{\log 15} + f(2)$  when  $x = 4$ .

$$n'(x) = 0$$

(b) Find  $h'(2)$  if  $h(x) = \frac{\ln(f(x))}{g(x)}$ .

$$h'(x) = \frac{\frac{1}{f(x)}f'(x)g(x) - \ln(f(x))g'(x)}{[g(x)]^2}$$

$$h'(2) = \frac{6 \ln 2 - \frac{5}{2}}{25}$$

(c) Find the derivative of  $k(x) = f(x) \cos\left(\frac{\pi}{6}x\right)$  when  $x = 2$ .

$$k'(x) = f'(x) \cos\left(\frac{\pi}{6}x\right) - f(x) \frac{\pi}{6} \sin\left(\frac{\pi}{6}x\right)$$

$$k'(2) = -\frac{1}{2} - \frac{\pi}{3} \cdot \frac{\sqrt{3}}{2}$$

(d) Find  $j'(2)$  if  $j(x) = f(g(x^2))$ .

$$j'(x) = f'(g(x^2))g'(x^2)2x$$

$$j'(2) = f'(2)g'(4)4 = 8$$