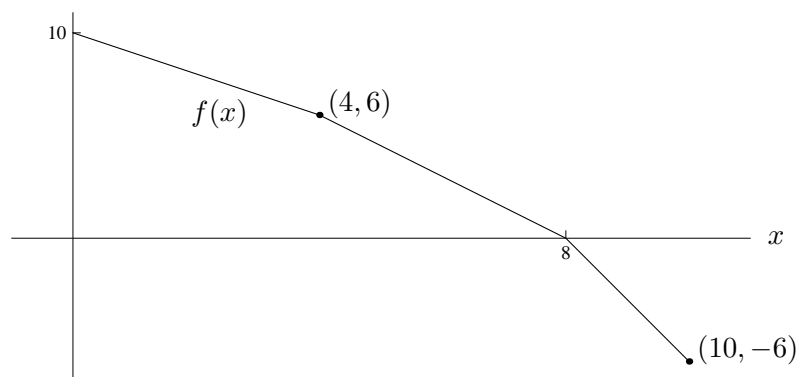


6. [16 points] Consider the piecewise linear function $f(x)$ graphed below:



For each function $g(x)$, find the value of $g'(3)$:

a. [4 points] $g(x) = \sin([f(x)]^3)$

Solution:

$$g'(x) = \cos(f(x)^3) \cdot 3f(x)^2 \cdot f'(x)$$

$$g'(3) = \cos(7^3) \cdot 3 \cdot 7^2 \cdot (-1) = 124.0442.$$

b. [4 points] $g(x) = \frac{f(x^2)}{x}$

Solution:

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

$$g'(3) = \frac{3(-3)6 - (-3)}{9} = -5.667.$$

c. [4 points] $g(x) = \ln(f(x)) + f(2)$

Solution:

$$g'(x) = \frac{1}{f(x)} f'(x) + 0$$

$$g'(3) = \frac{1}{7} \cdot (-1) = -\frac{1}{7}.$$

d. [4 points] $g(x) = f^{-1}(x)$

Solution:

$$g'(x) = \frac{1}{f'(f^{-1}(x))}$$

$$g'(3) = \frac{1}{f'(6)} = -\frac{2}{3}.$$