2024 AB/BC #4
(no calculator)

(a)

$g(-6) = \int_0^{-6} f(t)\,dt = -\int_{-6}^{0} f(t)\,dt = \boxed{-12}$

$g(4) = \int_0^{4} f(t)\,dt = \boxed{\frac{1}{2}(4)(2)}$ or 4

$g(6) = \int_0^{6} f(t)\,dt = \boxed{4 - \frac{1}{2}(2)(1)}$ or 3

(b)

g will have a critical point when $g'(x) = 0$ or undefined.

$g'(x) = f(x) = 0$ when $\boxed{x = 4}$.

(c)

$h(6) = \int_{-6}^{6} f'(t)\,dt = f(6) - f(-6) = -1 - 0.5 = \boxed{-1.5}$

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

$h'(6) = f'(6) = \boxed{\frac{-1-2}{6-0}}$ or $-\frac{1}{2}$

Note: This is the slope of the linear portion of the curve from $x = 0$ to $x = 7$.

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

$h''(6) = f''(6) = \boxed{0}$

Since curve is linear from $x = 0$ to $x = 7$ it's slope, $f'(x)$, is constant so $f''(x) = 0$ there.