3. [8 points]

a. [4 points] Write a formula for the function $G(t)$ whose derivative is $\cos(5t)$ and whose graph passes through the point $(0, 3)$.

Solution:

$$G(t) = \frac{\sin(5t)}{5} + 3$$

Alternatively:

$$G(t) = \int_0^t \cos(5u)\, du + 3$$

b. [4 points] Write a formula for the function $H(t)$ whose derivative is $\cos(t^5)$ and whose graph passes through the point $(0, 3)$.

Solution:

$$H(t) = \int_0^t \cos(u^5)\, du + 3$$

4. [5 points] A deep sea diver is swimming to the surface of the water from a depth of 50 meters. At a depth of x meters below the surface of the water, the water pressure is changing at a rate of $a(x)$ pascals/meter (pascal is the metric unit for pressure). If the water pressure is 592,000 pascals at a depth of 50 meters, write an expression involving integrals that gives the water pressure in pascals when the diver is x meters from the surface of the water.

Solution:

$$p(x) = 592,000 + \int_{50}^{x} a(t)\, dt$$

Alternative solution:

$$p(x) = \int_0^x a(t)\, dt$$

This assumes that the pressure at the surface of the water is 0.