Math 1510 Tutorial 10

I. Function $a(t)$ is the acceleration of an object moving along the x-axis during the time interval $t \geq 0$. Find the velocity $v(t)$ and the position $x(t)$ of the object if given conditions are satisfied.

(a) $a(t) = -2t + 5, \quad v(0) = 2, \ x(0) = 3$

(b) $a(t) = \sqrt{t}, \quad v(1) = 0, \ x(2) = -1$

(c) $a(t) = e^{-t}, \quad v(0) = -1/3, \ x(\ln 2) = 1$

II. A particle moving along the x-axis has acceleration $a(t) = t - 3$ meters per second per second where $t \geq 0$ is time in seconds. The particle starts at point $x = 2$ meters moving to the left with speed 2 meters per second

(a) Find the position of the particle as a function of time t.

(b) At what time does the particle have zero velocity?

(c) Is the particle speeding up or slowing down at $t = 4$ seconds?

III. Evaluate the indefinite integral.

(a) $\displaystyle\int \sqrt{2 - 3x}\, dx$

(b) $\displaystyle\int \frac{x}{(x^2 + 1)^3}\, dx$

(c) $\displaystyle\int \cos x \sqrt{2 + \sin x}\, dx$

(d) $\displaystyle\int \sin^3 x \cos^2 x\, dx$

(e) $\displaystyle\int \frac{e^{2x} + e^x}{e^x - 1}\, dx$

(f) $\displaystyle\int x^2 2^{x^3+1}\, dx$