Math 152 - Fall 2012 - 8/31 - Quiz #1 **Score:** _____ out of 10.

Name: Key

Show all work clearly and in order. Please box your answers. 10 minutes.

1. A particle is moving on a straight line with acceleration $a(t) = 2\sin(t) + 3$. Its velocity at $t = 0$ is $v(0) = 0$ and its position at time $t = 0$ is $s(0) = 10$.

   (a) Find the velocity function of the particle:

$$v(t) = \int a(t)\,dt = \int (2\sin(t) + 3)\,dt$$

$$= -2\cos(t) + 3t + C$$

So $v(t) = -2\cos(t) + 3t + C$

since $v(0) = 0$ we can solve for C:

$$v(0) = 0 = -2\cos(0) + 3\cdot 0 + C$$

$$0 = -2\cdot 1 + 0 + C$$

$$0 = -2 + C$$

$$C = 2$$

Hence

$$\boxed{v(t) = -2\cos(t) + 3t + 2}$$

   (b) Find the velocity of the particle at $t = 1$. $v(1) =$ $\boxed{-2\cos(1) + 5}$ or $\boxed{\approx 3.9194}$

   (c) Find the position function of the particle:

$$s(t) = \int v(t)\,dt = \int (-2\cos(t) + 3t + 2)\,dt$$

$$= -2\sin(t) + \frac{3t^2}{2} + 2t + D$$

So $s(t) = -2\sin(t) + \frac{3t^2}{2} + 2t + D$

since $s(0) = 10$ we can solve for D:

$$s(0) = 10 = -2\sin(0) + \frac{3\cdot 0^2}{2} + 2\cdot 0 + D$$

$$10 = 0 + 0 + 0 + D$$

$$D = 10$$

Hence, $\boxed{s(t) = -2\sin(t) + \frac{3}{2}t^2 + 2t + 10}$

   (d) Find the position of the particle at $t = 1$. $s(1) =$ $-2\sin(1) + \frac{3}{2} + 2 + 10 = \boxed{-2\sin(1) + \frac{27}{2}}$ or $\approx \boxed{11.817}$