Math 220 AD9, Spring 2009, Quiz 8

Name: Solutions

1. (Q. 49, p. 352) Determine the position function if the acceleration function is $a(t) = 3\sin t + 1$, the inital velocity is is $v(0) = 0$, and the initial position is $s(0) = 4$.

$$v(t) = \int a(t)\,dt = \int 3\sin t + 1 \; dt$$
$$= -3\cos t + t + c$$
$$v(0) = -3\cos 0 + 0 + c = \underbrace{-3 + c = 0}_{\text{as } v(0)=0} \Rightarrow c = 3$$

$$v(t) = -3\cos t + t + 3$$
$$s(t) = \int v(t)\,dt = \int -3\cos t + t + 3 \; dt$$
$$= -3\sin t + \tfrac{1}{2}t^2 + 3t + c_1$$
$$s(0) = 0 + 0 + 0 + c_1 = 4 \Rightarrow c_1 = 4$$
$$s(t) = -3\sin t + \tfrac{1}{2}t^2 + 3t + 4$$

2. (Q. 17, p. 360) Use summation rules to compute the sum – look carefully at the sum!

$$\sum_{i=3}^{n}(i^2 - 3)$$

$$\sum_{i=1}^{n}{}' (i^2-3) = (1-3) + (2^2-3) + \sum_{i=3}^{n}{}' (i^2-3)$$
$$= -1 + \sum_{i=3}^{n}{}' (i^2-3)$$

$$1 + \sum_{i=1}^{n}{}' (i^2-3) = \sum_{i=3}^{n}{}' (i^2-3)$$

$$1 + \frac{n(n+1)(2n+1)}{6} - 3n = \sum_{i=3}^{n}{}' (i^2-3)$$

Sum starts at 3, not 1.