Computational Physics – HW #3b

1. 3.4.18
2. 3.4.27
3. In the 4-D Euclidean vector space [you can think of this as position given by (x, y, z, w)] and the distance between the points:
   (a) (4m, -1m, 2m, 7m) and (2m, 3m, 1m, 9m)
   (b) (3m, 5m, 2m, 8m) and (2m, 6m, 2m, 8m)
4. In the 4-D Minkowski vector space [you can think of this as the locations of events in space-time given by (t, x, y, z)] consider the vectors pointing to the following events: (4ns, -1m, 2, 7) and (2ns, 3m, 1m, 9m)
   (a) Find the distance between the events.
   (b) Find the innerproduct between the two events.
5. Consider the generalized 2-D vector space with inner product $\vec{V}_1 * \vec{V}_2 = \int_0^{2\pi} V_1 V_2 dx$ spanned by the vectors $\vec{e}_1 = cos(x)$ and $\vec{e}_2 = sin(x)$.
   (a) What is the projection of the vector $\vec{v} = sin(x + \pi 3)$ on $\vec{e}_1$?
   (b) What is the projection of the vector $\vec{v} = sin(x + \pi 3)$ on $\vec{e}_2$?
   (c) What is the magnitude of $\vec{v}$?
6. 3.14.4