1. Section 13.1 #6.
2. Section 13.2 #26.
3. Section 13.2 #36.
4. Section 13.2 #42.
5. Section 13.2 #47.
6. Section 13.2 #53.
7. Section 13.2 #59.
8. Differentiate $|\vec{r}(t)|^2$ in two different ways, to derive an expression for $|\vec{r}|'$ in terms of $|\vec{r}\,'|$ and the cosine of a certain angle. Use this result to give an example where $|\vec{r}|' \neq |\vec{r}\,'|$.
9. Recall from an earlier class that a particle moving with velocity $\vec{v}$ in a uniform magnetic field $\vec{B}$ experiences force $\vec{F} = c\vec{v} \times \vec{B}$, where $c \neq 0$ is some constant of proportionality (which depends on the magnetic properties of the particle). You might also know that $\vec{F} = m\vec{a}$, where $m > 0$ is the particle's constant mass and $\vec{a}$ is the particle's acceleration. Let $\vec{x} : \mathbb{R} \to \mathbb{R}^3$ be the particle's trajectory through space. In other words, its position at time t is $\vec{x}(t)$.
   (a) Summarize this whole situation as a differential equation in $\vec{x}$. (A differential equation is an equation involving an unknown function and its derivatives — in this case, one or more of $\vec{x}$, $\vec{x}\,'$, $\vec{x}\,''$, etc.)
   (b) Now focus on the case where $\vec{B} = \langle 0, 0, 1 \rangle$. Write the differential equation explicitly in terms of x_1, x_2, x_3, and their derivatives.
   (c) Continuing in the case where $\vec{B} = \langle 0, 0, 1 \rangle$, find a solution $\vec{x}$. (Hint: It's probably easier to figure out what $\vec{x}\,'$ is, and then to figure out $\vec{x}$ from that. Also, if you're lost, try combinations of sines and cosines.)