Physics 5B Questionnaire

Please answer the following questions as well as you can. Your responses will help my teaching. This is *not* an exam, in any sense at all. Your responses will not affect your grade in any way.

Your name: _____

1. Nickname, or short name, if applicable (optional):

2. Email address: (**ONLY IF** different from your "official" email address, like the @ucsc.edu or @slugmail.ucsc.edu address):

3. Major and level: (optional)

4. Any topic that you "absolutely" want to learn/master in this course? Any similar topical request? (optional)

5. Your special personal goal in this course? (optional)

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1. $\cos\left(x + \frac{\pi}{2}\right) = ?$ (a) $\sin x$ (b) $-\sin x$ (c) $\cos x$ (d) $-\cos x$.
2. With A, B = constants, $\frac{d}{dx}\sin(Ax + B) = ?$
3. $\int dx\, \sin(Ax + B) = ?$
4. $\int_0^{2\pi} dx\, \cos(x + B) = ?$
5. (advanced) $\frac{1}{2\pi}\int_0^{2\pi} dx\, \cos^2(Ax + B) = ?$
6. Using the binomial expansion, find the approximate value of $(1.2)^{1/2}$. Do *not* use a calculator. Show your steps.

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1. A particle of mass m is moving with velocity $\vec{v}$, and acceleration $\vec{a}$. Define $v \equiv |\vec{v}|$ and $a \equiv |\vec{a}|$. What is the momentum of the particle?

2. For the same particle, what is the kinetic energy of the particle?

3. A hawk swoops down and catches a sparrow. The transition of the state of the hawk and the sparrow from just before the catch to just after the catch is a "collision" in the mechanical sense. Is this collision an elastic collision? If yes, explain. If no, what kind of collision is it (totally inelastic or partially inelastic)?

4. In the previous question, is the momentum conserved?

5. Consider a uniform circular motion with radius R and speed v. Find the period T, the angular velocity ω, and the magnitude of the centripetal acceleration a in terms of R and v.

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