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Final Exam

Essay Questions (10 points each). **Show your work**, partial-credit will be given. **Circle** your answer.

1) An object of mass 5835 kg rests on the flatbed of a truck. It is held in place by metal brackets that can exert a maximum horizontal force of 9120 N. When the truck is traveling 28 m/s, what is the minimum stopping time if the load is not to slide forward into the cab?

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2) A solid cylinder rolls down an incline plane without slipping. If the center of mass of the cylinder has a linear acceleration of 2.67 m/s^2, what is the angle of the incline to the horizontal?

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3) A rectangular box of negligible mass measures 5.0 m long, 1.0 m wide, and 0.50 m high. How many kilograms of mass can be loaded onto the box before it sinks in a pool of liquid mercury?

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4) A 10.0-m long wire whose total mass is 39.5 grams is under a tension of 577 N. A pulse is sent down the left end of the wire and 29 ms later a second pulse is sent down the right end of the wire. Where do the pulses first meet?

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5) A stone of mass 2.1 grams is dropped from a height of 0.96 m. If 0.061% of its energy is converted to sound for a duration of 0.143s, how far away can you hear the stone hit the ground? Assume you need at least an intensity of 1.00×10^{-8} W/m^2 to be able to hear the stone hit the ground.