PHY 201 Quiz #6 **Name** _____

Score _____

Instructions:
1. Do all of your work on this sheet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place you **answers in a box**. Do not forget **units**!
5. If you need more space, you may use the back of the page and write **On back** in the problem space.

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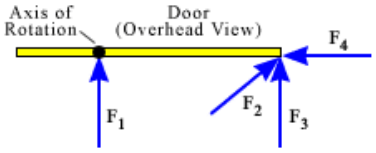
1. **Multiple Guess (3 pts)** Find the answer which best fits the question and write it in the space provided.

a. You are in a tall building located near the equator. As you ride an elevator from the ground floor to the top floor, your tangential speed due to the earth's rotation
   a) increases when the speed of the elevator increases and decreases when the speed of the elevator decreases.
   b) does not change. c) increases. d) decreases. _____

b. Starting from rest at the same height on an incline, which of the following objects will reach the bottom first?
   a) A box of mass M. b) a hoop with mass 2M and radius R;
   c) a sphere with mass M and radius R;
   d) a cylinder with mass M and radius 2R;

_____

c. Four equal magnitude forces act on the door as shown. The axis of rotation is perpendicular to your paper. Rank the corresponding torques. [τ_i is the torque due to $\mathbf{F}_i$ etc.]
   a) $\tau_4 < \tau_3 < \tau_2 < \tau_1$; b) $\tau_3 < \tau_2 < \tau_4 = \tau_1$; c) $\tau_2 < \tau_4 < \tau_3 < \tau_1$;
   d) $\tau_1 = \tau_4 < \tau_3 < \tau_2$; e) $\tau_1 = \tau_4 < \tau_2 < \tau_3$. _____



2. **Definition/Principle (5 pts)**

a. Fill in the exact missing analogous quantities:

Physical concept	**Rotational**	**Translational**
Velocity	_____	v
Centripetal Acceleration	_____	v^2/r
Inertia	I	_____
Kinetic Energy	_____	$\frac{1}{2}mv^2$

b. Give the exact rotational kinematics equation that involves θ, t, ω_0, and α.

Bonus: A car starts from rest and accelerates at 0.800 m/s^2 for 20.0 s. Assuming that the 0.800 diameter tires roll without slipping, how many revolutions did the tires make in this time?

3. **Problems (12 pts)** .

a. The radius of the circle traced out by the second hand on a clock is 6.00 cm. Find the time the tip of the second hand moves through an arc length of 24.0 cm.

b. A disk rotating at 12.0 rad/s decelerates at 4.00 rad/s^2 to a stop. Through how many revolutions does the disk move?

c. The angular position of a point on a wheel of radius 25.0 cm and mass 6.0 kg is given by $\theta = 5.0t + 2.0t^2$ rad. What is the tangential velocity at $t = 2.0$ s?

d. A 90.0N force is applied tangentially to the edge of a solid disk with mass 30.0 kg and radius 0.200 m. What is the resulting angular acceleration?

e. A ball begins to roll up an inclined plane without slipping at a translational speed of 3.0 m/s. How high does the ball get before turning around? Assume there is no energy loss.

f. Find the net torque (magnitude and direction) produced by the two forces in the figure below.