1. A wolverine with a mass of 17 kg and a bear with a mass of 147 kg stand on a frozen pond (on the planet Earth) 7 meters apart. What is the minimum coefficient of static friction between the wolverine and the ice that will prevent the wolverine from accelerating, due to gravity, toward the bear?

2. The mass of the Earth is approximately 5.97×10^{24} kg. Consider a planet with the same average density as that of the Earth. Compared to the Earth's radius, what radius would such a planet need to have in order for the acceleration due to gravity experience by a falling object near its surface to be half that on the surface of the Earth?

3. “I wonder if I should fall right through the Earth. How funny it’ll seem to come out among the people that walk with their heads downward!”

--“Alice in Wonderland,” by Lewis Carroll, 1864

Assume that all of the Earth’s mass is concentrated right at its center, in a negligible volume, what speed would Alice have when she was one meter from the core? Assume that she starts at the surface.

4. The radius of the Earth is approximately 6.37×10^3 km. People standing on the Earth typically use the Earth as a convenient reference frame. But this frame is non-inertial and so we experience a fictitious force due to the Earth's rotation. As we all know, Santa Claus travels from the North Pole to many points on Earth. Assuming Santa has a mass of 100 kg, what is the difference between his perceived weight at the North Pole and at the equator?

5. As we have seen, geostationary orbits are approximately 36,000 km above the Earth's surface. Radio signals travel at the speed of light, 3×10^8 m/s. A person in Edwardsville transmits a radio signal to a person in Greenwich, England by bouncing it off a geostationary satellite hovering over a point midway between them. How long after the signal is transmitted is it received? (This question isn't about gravity, it's about geometry and technology. But it's something that you should know.)