1. (3) A stereo turntable turns at 33 1/3 rev/min. What is the period for one revolution?

\[
f = \left(33 \frac{1}{3} \ \text{rev/min}\right) \left(\frac{1 \ \text{min}}{60 \ \text{s}}\right) = 0.555 \ \text{rev/s}
\]

\[
T = \frac{1}{f} = \frac{1}{0.555 \ \text{s}} = 1.8 \ \text{s}\text{rev}
\]

2. (3) A penny is placed on the turntable 10.0 cm from the axis of rotation. What is the speed of the penny?

\[
\omega = \frac{2\pi r}{T} = \frac{2\pi \left(0.1 \ \text{m}\right)}{1.8 \ \text{s}} = 0.349 \ \text{m/s} = 1.11 \ \text{rads} \text{ s}^{-1}
\]

\[
\omega = r \omega = (0.1 \ \text{m}) \left(33.333 \ \text{rev/min}\right) \left(\frac{2\pi \ \text{rad}}{\text{rev}}\right) \left(\frac{1 \ \text{min}}{60 \ \text{s}}\right) = 0.349 \ \text{m/s}
\]

\[
\omega = 20.9 \ \text{m/s}\text{min}
\]

3. (3) What is the centripetal acceleration of the penny?

\[
\omega = \frac{v^2}{r} = \frac{(0.349 \ \text{m/s})^2}{0.1 \ \text{m}} = 1.22 \ \text{m/s}^2 = 12 \ \text{m/s}^2
\]

\[
\omega = 1.22 \ \text{m/s} \left(\frac{60 \ \text{s}}{1 \ \text{min}}\right)^2 = 4.58 \times 10^5 \ \text{cm} \text{min}^{-2}
\]

4. (1) What force causes the centripetal acceleration on this penny?

Friction.