Work and Area of a Surface of Revolution

1. How much work needs to be done to lift a 100 gr cup of water off the floor to put it on a desk that is 0.7 m high.

2. When a particle is located a distance x feet from the origin, a force of $x^2 + 2x$ pounds acts on it. How much work is done in moving it from $x = 1$ to $x = 3$?

3. A tank has the shape of an inverted circular cone with height 10 m and base radius 4 m. It is filled with water to a height of 8 m. Find the work required to empty the tank by pumping all of the water to the top of the tank. (The density of water is 1000 kg/m^3.)

4. A 100 kg cable is 50 m long and hangs vertically from the top of a tall building. How much work is required to lift the cable to the top of the building?

5. Find the area of the surface obtained by rotating $y = \sqrt{4 - x^2}$, $-1 \le x \le 1$ about the x-axis

6. The arc of the parabola $y = x^2$ from (1,1) to (2,4) is rotated about the y-axis. Find the area of the resulting surface.

7. Find the area of the surface generated by rotating the curve $y = e^x$, $0 \le x \le 1$, about the x-axis.