# MATH 107-153 Recitation 16
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**1: Find the volume of the solid whose base is the region in the first quadrant bounded by $y = x^2$, $y = 1$, and the $y$-axis and whose cross-sections perpendicular to the $x$-axis are semicircles.**

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**2: Find the equation (in terms of $x$ and $y$) of the tangent line to the curve $r = 2\sin 4\theta$ at $\theta = \frac{\pi}{3}$.**

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**3: A storage shed is the shape of a half-cylinder of radius $r$ and length $l$.**

(a) **What is the volume of the shed?**

(b) **The shed is filled with sawdust whose density (mass/unit volume) at any point is proportional to the distance of that point from the floor. The constant of proportionality is $k$. Calculate the total mass of sawdust in the shed.**

**4: A bucket of water of mass 20 kg is pulled at constant velocity up to a platform 50 meters above the ground. This takes 20 minutes, during which time 4 kg of water drips out at a steady rate through a hole in the bottom. Find the work needed to raise the bucket to the platform. (Use $g = 9.8\frac{m}{s^2}$.)**