# Quiz 7 Information

Quiz 7 will cover the following material: (all handouts posted on the web site so far)

1. All material for Quizzes 1-6 and Exam 1
2. Computing volumes and areas between graphs.
3. Computing work.

## Sample Quiz 7

1. Let $R$ be the region bounded by $y = \sqrt{x}$, $x = 1$, $x = 9$, and $y = 0$. Compute the exact value of the volume of the object we obtain by rotating $R$

   a) about the $x-$axis

   b) about the line $x = -3$

   c) about the $y-$axis

   d) about the line $x = 12$

2. Suppose that $m > 0$. Let $R$ be the region between $y = mx$ and $y = mx^2$ between $x = 0$ and $x = 1$. Compute the value of $m$ if we know that $V_x = V_y$ where $V_x$ is the volume of the object we obtain by rotating $R$ about the $x-$axis and $V_y$ is the volume of the object we obtain by rotating $R$ about the $y-$axis.

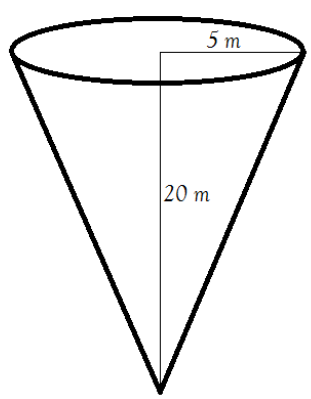
3. Use integration to compute the volume of the torus we obtain when we rotate the circle $x^2 + y^2 = 4$ about the line $x = 6$.

4. Let $R$ be the region bounded by the ellipse $\dfrac{x^2}{4} + \dfrac{y^2}{9} = 1$ and the $x-$axis. Compute the volume of the object we obtain when rotating $R$

   a) about the $x-$axis.

   b) about the line $x = 7$.

5. A tank, shaped like a straight cone is positioned with its circular base upward. It is full of water. Compute the work that is required to pump out all the water from the tank. Assume the following: at all times, the pipe is leveled at the surface of the water, and we are pumping out the water to the top of the tank. The density of water is $1000\dfrac{\text{kg}}{\text{m}^3}$ and the $g = 9.81\dfrac{\text{m}}{\text{s}^2}$




6. The gravitational force between two objects can be computed as $F_{gr} = \dfrac{m_1 m_2 G}{r^2}$ where $m_1$ and $m_2$ denote the mass of each of the two objects, $r$ is the distance between their centers of mass, and $G$ is the universal gravitational constant, $G = 6.67 \times 10^{-11}\dfrac{\text{N m}^2}{\text{kg}^2}$. We want to lift a spaceship, measuring 1000 kg, from the surface of the Earth to a galaxy far, far from ours. How much work does this require? (Assume that Earth is a sphere with radius 6370 km and mass of $5.97 \times 10^{24}$ kg.)

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## Answers

1.) a) $40\pi$ b) $\frac{1488}{5}\pi$ c) $\frac{968}{5}\pi$ d) $\frac{1112}{5}\pi$ 2.) $m = \frac{5}{4}$ 3.) $48\pi^2$

4.) a) $24\pi$ b) $42\pi^2$

5.) $8175000\pi(\text{ J}) \approx 25682519.943\,1\ (\text{ J})$ 6.) $62\,511\,616\,954.474\,1\ (\text{ J})$