Note ♯2: Volumes (Shells)

Problem 1. Find the volume of the solid obtained by rotating the region bounded by $y = \sqrt{x-1}$, $y = 1$, $y = 3$ and the y–axis around the x–axis.

Problem 2. Find the volume of the solid obtained by rotating the region bounded by $y = x^2 - x$ and around the line $x = 5$.

Problem 3. Find the volume of the solid obtained by rotating the region bounded by $x = y^2 - 3y + 4$ and $x = -y^2 + y + 4$ about the line $y = -1$.

Problem 4. Find the volume of the solid obtained by rotating the region bounded by $x = y^2 + 1$ and $x = y + 3$ about the line $y = -2$.

Note ♯2: Work

Problem 5. A particle is moved along the x axis by a force that measures $f(x) = x^3\sqrt{x^4+1}$ pounds at a point x feet from the origin. Find the work in moving the object from $x = 2$ to $x = 5$.

Problem 6. Suppose a spring has a natural length of .1 m and it takes a force of 8 N to hold it stretched to .3 m. How much work is required to stretch it from .15m to .25m?

Problem 7. Suppose a spring has a natural length of .1 m and it takes a force of 8 N to hold it stretched to .3 m. How much work is required to stretch it from .15m to .25m?

Problem 8. A rope that is 30 m long and weighs 10 kg hangs over the top of a building. How much work does it take to pull the rope to the top? How much work does it take to pull the half the rope to the top?

Problem 9. A 100 foot rope is hanging over a building. The linear density of the rope is $\frac{x+1}{10}$ feet per foot (with the lighter end of the rope at the top of the building.) Find the work to bring the rope to the top. Find the work to bring half the rope to the top.

Continue work here.

Problem 10. A pool is 50 m long and 25 m wide. At one end the pool is 4 m deep and at the other end the pool is 1m deep. The pool slopes upward in a line from the deep to the shallow end. Find the work done in pumping the water from the pool. Find the work in pumping the water down to a level of 2 m.

Continue work here.