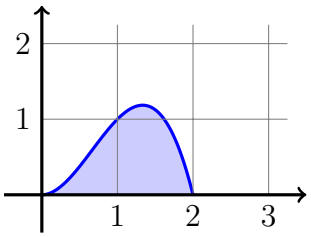
Homework 10 - Math 142 **Name:** _____

1. Find the volume of the solid obtained by revolving the region under $y = 2x^2 - x^3$ (shown below) around the y-axis.



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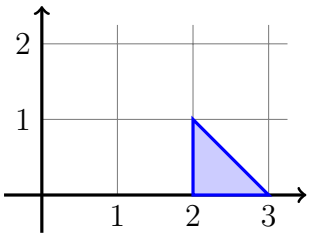
2. What is the volume of the solid obtained by revolving the triangle shown below around the y-axis?



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3. Find the length of the curve $y = \frac{4}{3}x^{3/2}$ from $x = 0$ to $x = 6$.

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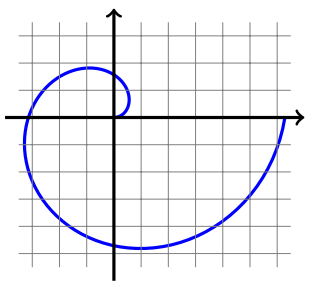
4. Set up a definite integral that represents the length of Archimedes spiral (shown below), which is given by the parametric equations $x(t) = t\cos t$, $y(t) = t\sin t$ from $t = 0$ to $t = 2\pi$. You don't need to calculate the integral.



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5. A force of $F = 20x - x^3$ Newtons is needed to stretch a nonlinear spring by x meters. How much work is required to stretch it from $x = 0$ to $x = 2$ meters?

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6. A twenty foot chain that weighs 3 lbs. per foot is hanging from a winch 20 feet above ground level. How much work is needed to wind the chain up?

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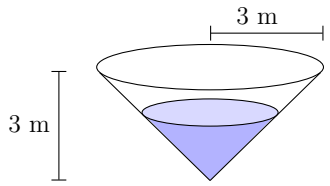
7. A conical pool has a radius of 3 meters and a depth of 3 meters. Initially the water in the pool is 2 meters deep. How much work is needed to pump all of the water in the tank up to the surface? (Recall that the weight density of water is 9800 Newtons per meter cubed).



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8. What if the pool is a hemisphere with radius 3 meters? If the water is initially two meters deep, then how much work would it take to pump the water out of the pool? *For this problem it is enough to write down the definite integral. You do not need to evaluate it.*