Warmup 1 Week of Sep 5th

1. What is the relationship between the disk method and the washer method?

1. The disk method is the washer method with inner radius equal to zero
2. The disk method computes areas, the washer method computes volumes
3. The washer method often leads to integrals that are easier to evaluate than those from the disk method
4. The disk method deals with solids obtained by rotating around the x-axis, while the washer method deals with solids obtained by rotating around the y-axis
5. They are not related

2. The shell formula calls for integrating 2π times the shell radius times the shell height. What is the explanation for the 2π factor?

1. 2π times the shell height represents the area of the shell
2. 2π times the shell radius represents the circumference of the cylindrical shell base
3. 2π times the shell radius represents the area of the cylindrical shell base
4. 2π represents the thickness of the shell
5. There is always a factor of 2π in integral formulas

3. One parametric representation of a circle of radius r is $x = r\cos t, y = r\sin t$ for $0 \leq t \leq 2\pi$, but an alternate parametric representation is $x = r\cos 2t, y = r\sin 2t$ for $0 \leq t \leq \pi$. Why should we expect $\int_0^\pi \sqrt{(\frac{dx}{dt})^2 + (\frac{dy}{dt})^2}\ dt$ for the second parameterization to give the same value for the circumference as the first parameterization gave?

1. It traverses the circle at twice the speed in half the time
2. It traverses the circle at half the speed in twice the time
3. The book says so, and the book is always right!
4. It goes around the circle twice, so it should not give the same value
5. It only goes around half the circle, so it should not give the same value

4. To calculate $A = \int 2\sin x\cos x dx$, 3 students come up with 3 different answers

1. Using the sub $u = \sin x$, $A = \int 2udu = u^2 + C_1 = \sin^2 x + C_1$
2. Using the sub $u = \cos x$, $A = \int -2udu = -u^2 + C_2 = -\cos^2 x + C_2$
3. Using the trig identity $\sin 2x = 2\sin x\cos x$, $A = \int \sin 2x dx = -\frac{\cos 2x}{2} + C_3$

Which one is correct?