Name: _____ Date: _____ Period: _____ 2017

AP Calculus – 7.4 Surface Areas of Revolved Curves

Function revolved around the x-axis: $S = \int_a^b 2\pi f(x)\sqrt{1+\left(f'(x)\right)^2}\,dx$

Function revolved around the y-axis: $S = \int_c^d 2\pi g(y)\sqrt{1+\left(g'(y)\right)^2}\,dy$

Parametric revolved around the x-axis: $S = \int_{t_1}^{t_2} 2\pi y(t)\sqrt{\left(\frac{dx}{dt}\right)^2+\left(\frac{dy}{dt}\right)^2}\,dt$

Parametric revolved around the y-axis: $S = \int_{t_1}^{t_2} 2\pi x(t)\sqrt{\left(\frac{dx}{dt}\right)^2+\left(\frac{dy}{dt}\right)^2}\,dt$

Determine the Surface Area of Revolution by using one of the formulas above after revolving it around the given axis and over the given interval. #1-5 Do completely algebraically/analytically. #3 get to $\int \sqrt{u^2+1}\,du$

1. $f(x) = \sqrt{4-x^2}$, x-axis, $-1 \le x \le 1$

2. $f(x) = x^2$, y-axis, $1 \le y \le 4$

3. $f(x)=\sin(\pi x)$, x-axis, $0 \le x \le 1$

4. $f(x)=\sqrt[3]{x}$, y-axis, $1 \le y \le 2$

5. $\begin{aligned} x(t) &= \sin t \\ y(t) &= 1+\sin t \end{aligned}$, x-axis, $0 \le t \le \dfrac{\pi}{2}$

6. $\begin{aligned} x(t) &= \ln(\sec t+\tan t) \\ y(t) &= \sec t \end{aligned}$, y-axis, $0 \le t \le \dfrac{\pi}{4}$