AP Calculus BC Name________________________Pd.____

Arc Length: Rectangular and Parametric P, P, & V Day 5

Make sure you can plug these into your calculator!!!

1-4: Set up the integral that represents the length of the curve. Then use your calculator to find the length correct to four decimal places.

1. $y=\sin x,\quad 0\le x\le \pi$

$f'(x)=\cos x$

$\int_0^{\pi} \sqrt{1+\cos^2 x}\,dx = \boxed{3.8202}$

$\boxed{\text{2nd}}$ $\boxed{7}$ $\int((1+(\cos(x))\wedge 2)\wedge(1\div 2), x, 0, \pi)$

2. $y=xe^{-x},\quad 0\le x\le 2$

$f'(x)=xe^{-x}(-1)+e^{-x}(1)=e^{-x}(1-x)$

$\int_0^2 \sqrt{1+[e^{-x}(1-x)]^2}\,dx$

$\int_0^2 \sqrt{1+e^{-2x}(1-x)^2}\,dx = \boxed{2.1024}$

3. $x=\sqrt{y}-y,\quad 1\le y\le 4$

$x'(t)=\frac{1}{2}y^{-1/2}-1$

$\int_1^4 \sqrt{1+\left(\frac{1}{2\sqrt{y}}-1\right)^2}\,dy \approx \boxed{3.6095}$

4. $x=y^2-2y,\quad 0\le y\le 2$

$x'(t)=2y-2$

$\int_0^2 \sqrt{1+(2y-2)^2}\,dy = \boxed{2.9579}$

5-8: Set up the integral that represents the length of the curve. Then use your calculator to find the length correct to four decimal places.

5. $x=t+e^{-t},\quad y=t-e^{-t},\quad 0\le t\le 2$

$x'(t)=1+e^{-t}(-1)\quad y'(t)=1-e^{-t}(-1)$

$\int_0^2 \sqrt{(1-e^{-t})^2+(1+e^{-t})^2}\,dt \approx \boxed{3.1416}$

6. $x=t^2-t,\quad y=t^4,\quad 1\le t\le 4$

$x'(t)=2t-1\quad y'(t)=4t^3$

$\int_1^4 \sqrt{(2t-1)^2+16t^6}\,dt = \boxed{255.3756}$

7. $x=t-2\sin t,\quad y=1-2\cos t,\quad 0\le t\le 4\pi$

$x'(t)=1-2\cos t\quad y'=-2(-\sin t)=2\sin t$

$\int_0^{4\pi} \sqrt{(1-2\cos t)^2+(2\sin t)^2}\,dt$

$\approx \boxed{26.7298}$

8. $x=t+\sqrt{t},\quad y=t-\sqrt{t},\quad 0\le t\le 1$

$x'(t)=1+\frac{1}{2}t^{-1/2}\quad y'(t)=1-\frac{1}{2}t^{-1/2}$

$\int_0^1 \sqrt{\left(1+\frac{1}{2\sqrt{t}}\right)^2+\left(1-\frac{1}{2\sqrt{t}}\right)^2}\,dt$

$=2.0915$