MATH1210: HOMEWORK SOLUTIONS §2.9

1. $y = x^2 + x - 3$

$dy = (2x+1)\,dx$

3. $y = (2x+3)^{-4}$

$dy = -4(2x+3)^{-5} \cdot 2\,dx$

5. $y = (\sin x + \cos x)^3$

$dy = 3(\sin x + \cos x)(\cos x - \sin x)\,dx$

7. $y = (7x^2+3x-1)^{-3/2}$

$dy = \frac{-3}{2}(7x^2+3x-1)^{-5/2}(14x+3)\,dx$

9. $s = \sqrt{(t^2 - \cot t + 2)^3}$

$= (t^2 - \cot t + 2)^{3/2}$

$ds = \frac{3}{2}\sqrt{t^2 - \cot t + 2} \cdot (2t + \csc^2 t)\,dt$

17. $y = x^4 + 2x$

a) $x = 2$, $\Delta x = .1$

$y = 2^4 + 2(2) = 20$

$dy = (4x^3 + 2)\,dx$

$dy = (4(2)^3 + 2)(.1) = 3.4$

21. $A = 4\pi r^2$

$dA = 8\pi r\, dr$

$\Delta r = .125 \quad , \quad r = 5$

$\Delta A = 8\pi(5)\cdot(.125)$

$= 5\pi$

27. $d = 20 \pm .1 \Rightarrow r = 10 \pm .5$

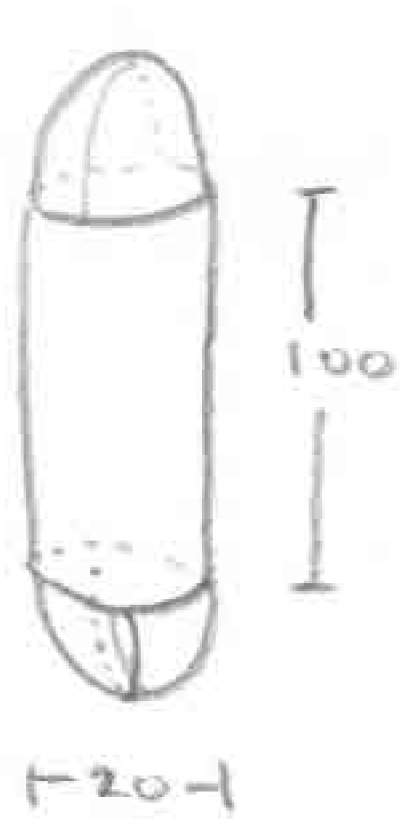
$V = \frac{4}{3}\pi r^3 \qquad dV = 4\pi r^2\, dr$

$V = \frac{4}{3}\pi(10)^3 = \frac{4000\pi}{3}$

$\Delta V = 4\pi r^2\, \Delta r$

$= 4\pi(10)^2(\pm .5)$

$= \pm 200\pi$

35. 

cover the cylinder and a sphere

$V_{cyl} = 100\pi r^2 \qquad V_{sph} = \frac{4}{3}\pi r^3$

$dV_{cyl} = 200\pi r\, dr \qquad dV_{sph} = 4\pi r^2\, dr$

$\Delta r = .1$

$\Delta V = \Delta V_{cyl} + \Delta V_{sph} \approx dV_{cyl} + dV_{sph}$

$= 200\pi(10)(.1) + 4\pi(10)^2(.1)$

$= 200\pi + 40\pi = 240\pi$