37. An hualisty the integral by changing to spherical , setenibroon) 0) 21-45 (25-45-Az x A copy op op op retainly coordinates at let r= p sim & reso y = P sind sind jong dydx = p2 sin p dpd ddb 3= 7 1/2 + 1/2 = Can 3 = Spring drose + 62 sing & sing 0 & cost 0 = pt sint of 1 = Sint COIX O 31 × 18 1: tan o 0= tan-1(1) 129 X104

B = J2-x2-y2 = hamisphere p ROID= 12 - p2sin2 d ROD20 - p2sin20 sin20 PROSO = 52- P sin2 0 (cos20 + sin20) PROJO = 2 - (sin') $f^{2}(\cos^{2}\phi + \sin^{2}\phi) = 2$ P= ± J2 The Our lower limit is forma le 0, :. p2 + J2 3= 51-x2 = hemisthey con y-any prost = 11- p2 sin2 & ros20 25 7 - 21- 5× T CB3.0 1 = 8 sin 20 e mid = 1 0 = sin-1(1) .. Ragion E in spherical recordinates.

(O, O, P): 05 0 5 5 5 6 4 4; 0 5 P 5 52}

 $\int_{0}^{\infty} \int_{0}^{\infty} \int_{0$ - prsino op gd 90 = (2 (4) 2 + sin 3 q sin 0 (10) 0 dp dp dA - So So So So So Sing of sing cost of do = Pt | # 452 sing pine coredopde = 452 (= 5 sin d db - 5 sin 3 ddf sino roso do sin 3 0 = 10 4 3 sin 0 - 4 sin 3 0 sin³ \$ = 3 sin \$ - sin 3 \$ $4\sqrt{2}$ $\int_{0}^{\pi} \left[\frac{3}{4} \left(- \cos 4 \right)_{0}^{\pi} - \frac{1}{4} \left(- \frac{\cos 3}{3} \right)_{0}^{\pi} \right]_{0}^{\pi}$ $\int_{0}^{\pi} \cos \theta$

$$= \frac{4\sqrt{2}}{5} \int_{0}^{\frac{1}{2}} \frac{2}{4} \left(\frac{1}{52} - \frac{1}{1} \right) + \frac{1}{612} \left(-\frac{1}{52} - \frac{1}{1} \right) \sin \theta \cos \theta d\theta$$

$$= \frac{4\sqrt{2}}{5} \int_{0}^{\frac{1}{2}} \frac{2}{4} \left(\frac{1}{52} - \frac{1}{12} \right) + \frac{1}{12} \left(-\frac{1}{52} - \frac{1}{12} \right) \sin \theta \cos \theta d\theta$$

$$= \frac{4\sqrt{2}}{5} \int_{0}^{\frac{1}{2}} \frac{2}{4\sqrt{2}} \left(-\frac{2}{3} + \frac{3\sqrt{2}}{3} \right)^{\frac{1}{2}} - \left(\frac{1}{4} + \frac{1}{2} \right) \sin \theta \cos \theta d\theta$$

$$= \frac{4\sqrt{2}}{5} \int_{0}^{\frac{1}{2}} \frac{2}{4\sqrt{2}} \left(-\frac{1}{2} - \frac{1}{2} \right) \sin \theta \cos \theta d\theta$$

$$= \frac{4\sqrt{2}}{5} \cdot \left(\frac{8\sqrt{2} - 10}{12\sqrt{2}} \right) \int_{0}^{\frac{1}{2}} \frac{1}{12} \sin 2\theta d\theta$$

$$= \frac{2}{4\sqrt{2} - 5} \cdot \left(\frac{4\sqrt{2} - 5}{3} \right) \cdot \frac{1}{2} \left(-\frac{1}{2} - \frac{1}{2} \right) \cos \theta d\theta$$

$$= \frac{4\sqrt{2} - 5}{30} \cdot \left(-\frac{1}{2} + \frac{1}{2} \right) \cos \theta d\theta$$

(বিশ