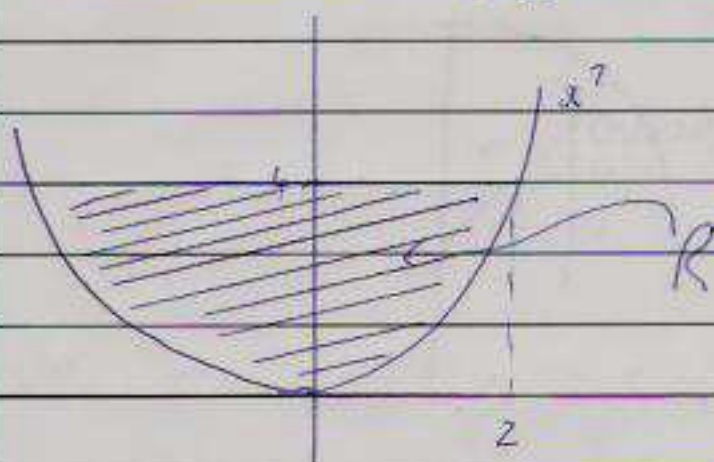


2006 ANNUAL EXAM - question 1 outline soln

a) $R = \{(x, y) \mid x^2 \leq y \leq 4\}$



$$\iint_R e^{y^{3/2}} dx dy = \int_0^4 dy \int_{-\sqrt{y}}^{\sqrt{y}} dx e^{y^{3/2}}$$

I write as an iterated integral; it seems a good idea to do x integral first since the y -integral looks difficult.

$$= \int_0^4 dy e^{y^{3/2}} x \Big|_{-\sqrt{y}}^{\sqrt{y}}$$

$$= 2 \int_0^4 \sqrt{y} dy e^{y^{3/2}}$$

$$u = y^{3/2}$$

$$du = \frac{3}{2} \sqrt{y} dy$$

$$y=0 \Rightarrow u=0$$

$$y=4 \Rightarrow u=8$$

$$= \frac{4}{3} \int_0^8 du e^u = \frac{4}{3} (e^8 - 1)$$