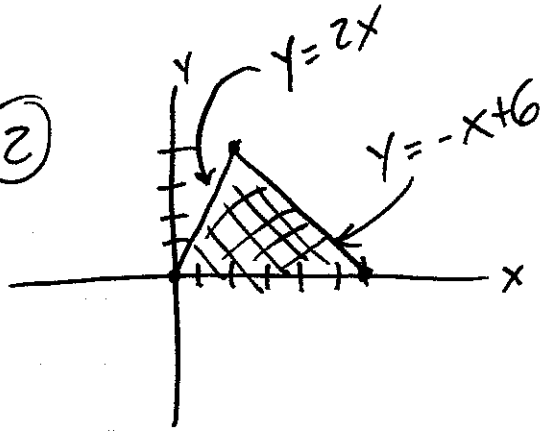
PS 20 Selected Solutions

① $$\int_0^1 x-(2x^2-x)\,dx = \int_0^1\int_{2x^2-x}^{x} 1 \; dy\,dx$$

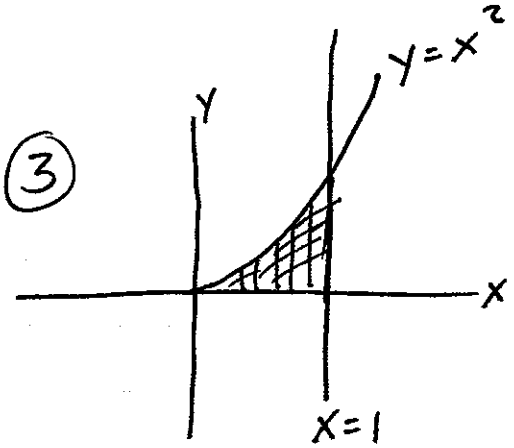
②



$$\int_0^4\int_{y/2}^{-y+6} ye^x \; dx\,dy$$

$$= -9e^2 + e^6 - 4$$

③

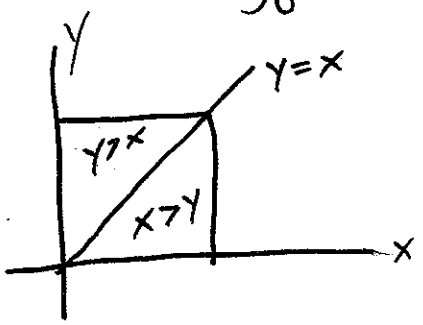


$$\int_0^1\int_0^{x^2} \sqrt{x^3+1} \; dy\,dx$$

$$= \int_0^1 x^2\sqrt{x^3+1} \; dx$$

$$= \frac{4\sqrt{2}-2}{9}$$

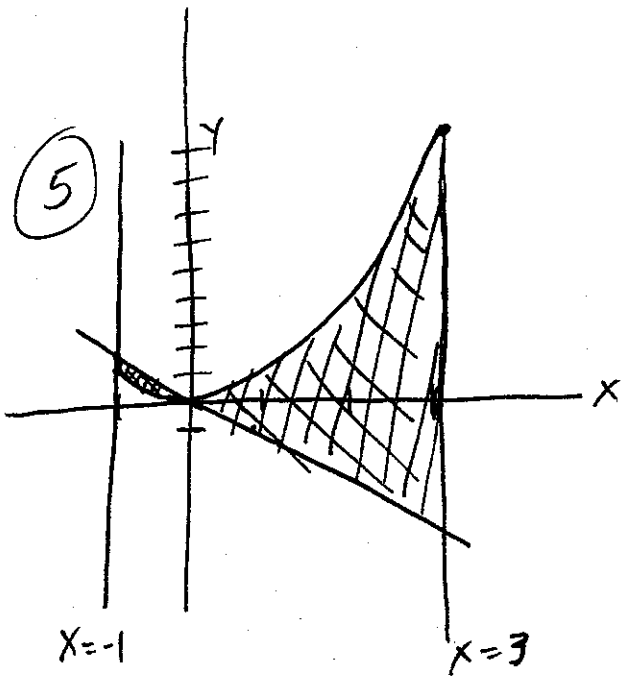
(4) $$\int_0^1 \int_0^1 e^{\max(x^2,y^2)}\,dx\,dy = \int_0^1\int_0^x e^{x^2}\,dy\,dx$$



$$+ \int_0^1 \int_0^y e^{y^2}\,dx\,dy$$

$$= e - 1$$

(5)



$$\int_{-1}^{3}\int_{-x}^{x^2} f(x,y)\,dy\,dx$$

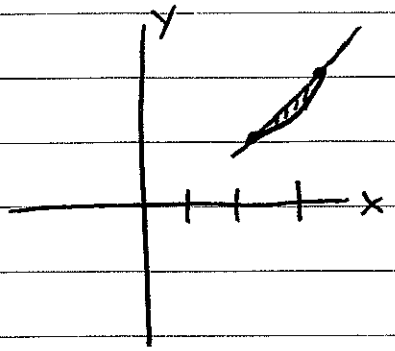
$$= \int_0^1\int_{-\sqrt{y}}^{-y} f(x,y)\,dx\,dy$$

$$+ \int_0^9\int_{\sqrt{y}}^{3} f(x,y)\,dx\,dy$$

$$+ \int_{-3}^{0}\int_{-y}^{3} f(x,y)\,dx\,dy$$

PS 20 Cont.

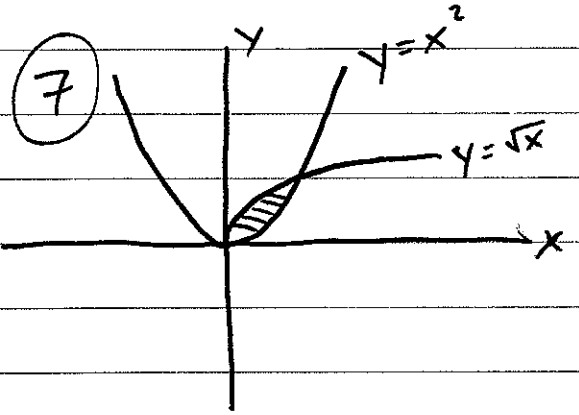
(6) $$\iint_R x \, dA = \int_2^3 \int_{x^2+1}^{5x-5} x \, dy \, dx$$



$$= \int_2^3 x(5x-5-x^2-1)\, dx$$

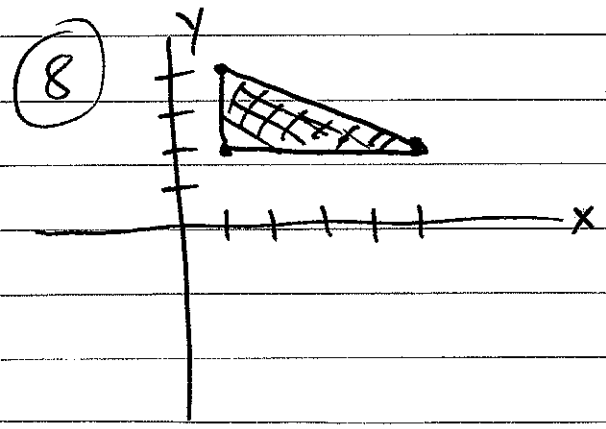
$$= 5/12$$

(7)



$$\text{Vol.} = \int_0^1 \int_{x^2}^{\sqrt{x}} 10+y-x^2 \, dy \, dx$$

(8)



$$\text{Vol.} = \int_1^5 \int_2^{-\frac{1}{2}x+\frac{9}{2}} xy \, dy \, dx$$

PS 20 Cont.

(9) $\text{mass} = \iint_R \rho(x,y)\,dA = \int_0^1 \int_0^{-2x+2} 1+3x+y \; dy\, dx$