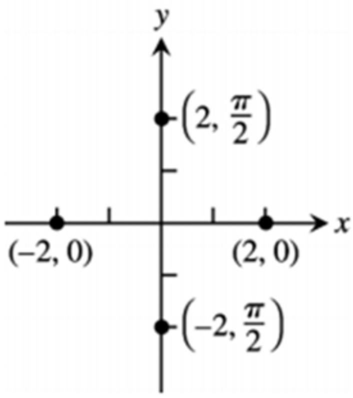
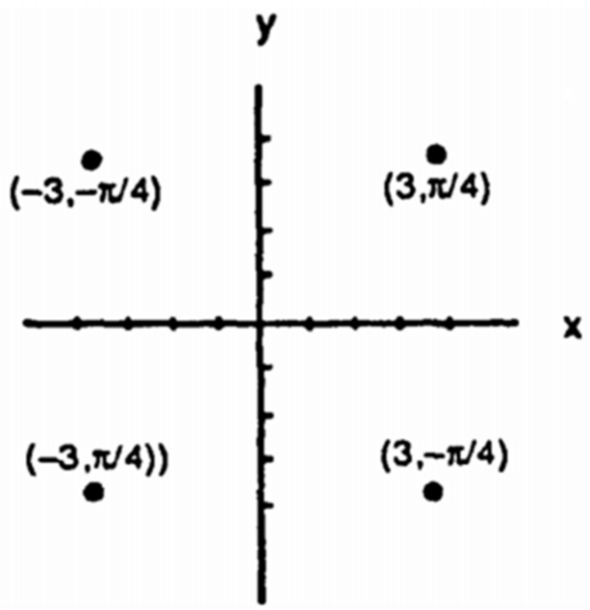
1.

(c) $\left(2, \frac{3\pi}{2} + 2n\pi\right)$ and $\left(-2, \frac{3\pi}{2} + (2n+1)\pi\right)$, n an integer



(c) $\left(3, -\frac{\pi}{4} + 2n\pi\right)$ and $\left(-3, \frac{3\pi}{4} + 2n\pi\right)$, n an integer



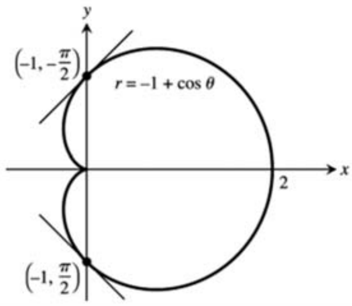
2.

38. $r^2 \sin 2\theta = 2 \Rightarrow 2r^2 \sin\theta\cos\theta = 2 \Rightarrow (r\sin\theta)(r\cos\theta) = 1 \Rightarrow xy = 1$, hyperbola with focal axis $y = x$

62. $x^2 + xy + y^2 = 1 \Rightarrow x^2 + y^2 + xy = 1 \Rightarrow r^2 + r^2\sin\theta\cos\theta = 1 \Rightarrow r^2(1 + \sin\theta\cos\theta) = 1$

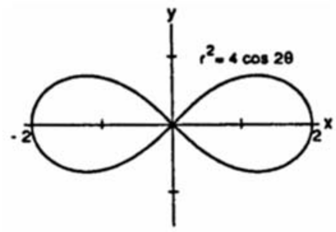
3.

17. $\theta = \frac{\pi}{2} \Rightarrow r = -1 \Rightarrow \left(-1, \frac{\pi}{2}\right)$, and $\theta = -\frac{\pi}{2} \Rightarrow r = -1 \Rightarrow \left(-1, -\frac{\pi}{2}\right)$; $r' = \frac{dr}{d\theta} = -\sin\theta$; Slope $= \frac{r'\sin\theta + r\cos\theta}{r'\cos\theta - r\sin\theta} = \frac{-\sin^2\theta + r\cos\theta}{-\sin\theta\cos\theta - r\sin\theta} \Rightarrow$ Slope at $\left(-1, \frac{\pi}{2}\right)$ is $\frac{-\sin^2\left(\frac{\pi}{2}\right) + (-1)\cos\frac{\pi}{2}}{-\sin\frac{\pi}{2}\cos\frac{\pi}{2} - (-1)\sin\frac{\pi}{2}} = -1$; Slope at $\left(-1, -\frac{\pi}{2}\right)$ is $\frac{-\sin^2\left(-\frac{\pi}{2}\right) + (-1)\cos\left(-\frac{\pi}{2}\right)}{-\sin\left(-\frac{\pi}{2}\right)\cos\left(-\frac{\pi}{2}\right) - (-1)\sin\left(-\frac{\pi}{2}\right)} = 1$



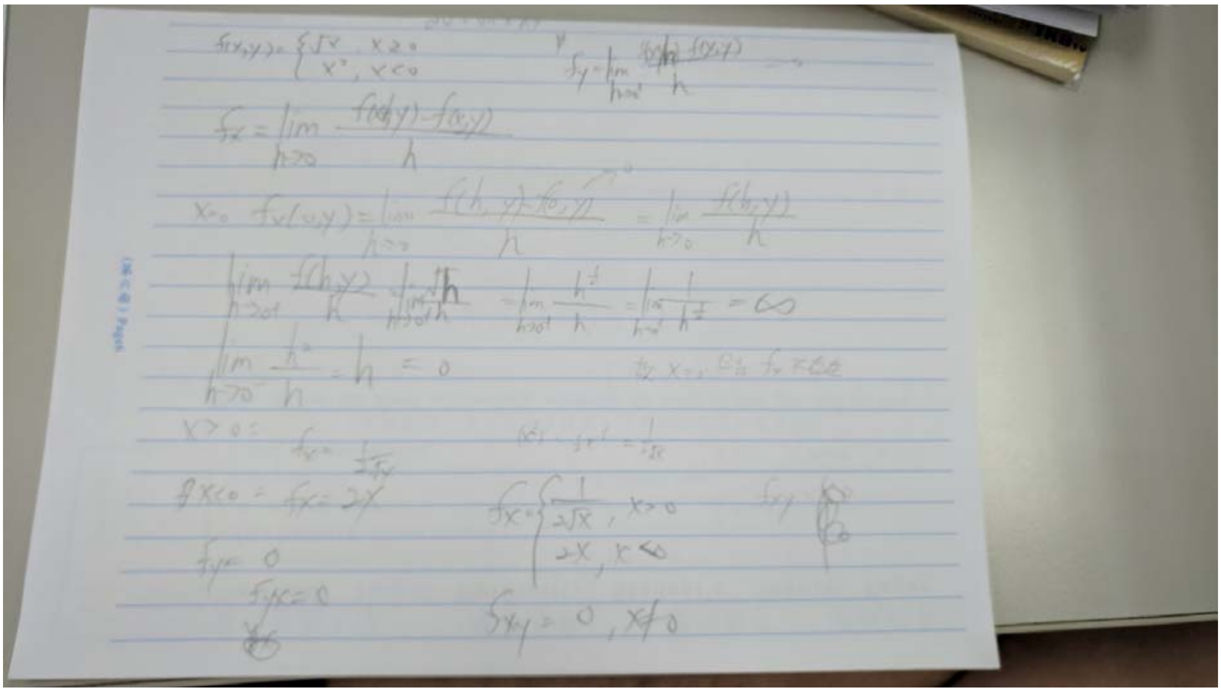
4.

13. Since $(\pm r, -\theta)$ are on the graph when (r, θ) is on the graph $\left((\pm r)^2 = 4\cos 2(-\theta) \Rightarrow r^2 = 4\cos 2\theta\right)$, the graph is symmetric about the x-axis and the y-axis $\Rightarrow$ the graph is symmetric about the origin



	θ	2θ	$\cos 2\theta$	$4\cos 2\theta$	$\sqrt{2^2\cos 2\theta}$
0	0°	0	1	4	2
$\pi/6$	30°	60°	1/2	2	$\sqrt{2}$
$\pi/4$	45°	90°	0	0	0
$\pi/3$	60°	120°	-1/2	-2	—
$\pi/2$	90°	180°	-1	-4	—

5.



$f(x,y) = \begin{cases} \sqrt{x}, & x \ge 0 \\ x^2, & x < 0 \end{cases}$

$f_y = \lim_{h \to 0} \frac{f(x,y+h) - f(x,y)}{h}$

$f_x = \lim_{h \to 0} \frac{f(x+h,y) - f(x,y)}{h}$

$x=0$: $f_x(0,y) = \lim_{h \to 0} \frac{f(h,y) - f(0,y)}{h} = \lim_{h \to 0} \frac{f(h,y)}{h}$

$\lim_{h \to 0^+} \frac{f(h,y)}{h} = \lim_{h \to 0^+} \frac{h^{\frac{1}{2}}}{h} = \lim_{h \to 0^+} \frac{1}{h^{\frac{1}{2}}} = \infty$

$\lim_{h \to 0^-} \frac{h^2}{h} = h = 0$

$x>0$: $f_x = \frac{1}{2\sqrt{x}}$

$x<0$: $f_x = 2x$

$f_y = 0$

$f_{yx} = 0$

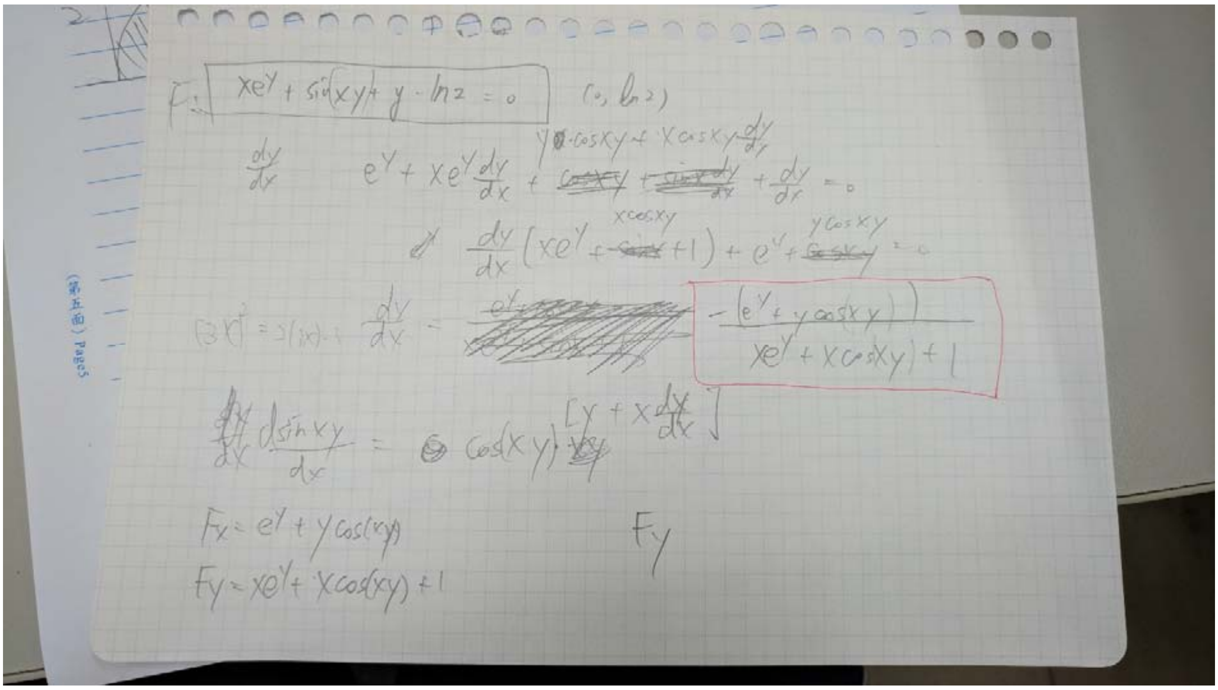
$f_x = \begin{cases} \frac{1}{2\sqrt{x}}, & x > 0 \\ 2x, & x < 0 \end{cases}$

$f_{xy} = 0, \ x \ne 0$

6.

28. Let $F(x, y) = xe^y + \sin xy + y - \ln 2 = 0 \Rightarrow F_x(x, y) = e^y + y\cos xy$ and $F_y(x, y) = xe^y + x\sin xy + 1$
$\Rightarrow \frac{dy}{dx} = -\frac{F_x}{F_y} = -\frac{e^y + y\cos xy}{xe^y + x\sin xy + 1} \Rightarrow \frac{dy}{dx}(0, \ln 2) = -(2 + \ln 2)$

課本答案有錯



$F: \boxed{xe^y + \sin(xy) + y - \ln 2 = 0}$ $(0, \ln 2)$

$\frac{dy}{dx}$: $e^y + xe^y\frac{dy}{dx} + y\cos xy + x\cos xy\frac{dy}{dx} + \frac{dy}{dx} = 0$

$\frac{dy}{dx}(xe^y + x\cos xy + 1) + e^y + y\cos xy = 0$

$\frac{dy}{dx} = \boxed{\frac{-(e^y + y\cos xy)}{xe^y + x\cos(xy) + 1}}$

$\frac{d\sin xy}{dx} = \cos(xy)\left[y + x\frac{dy}{dx}\right]$

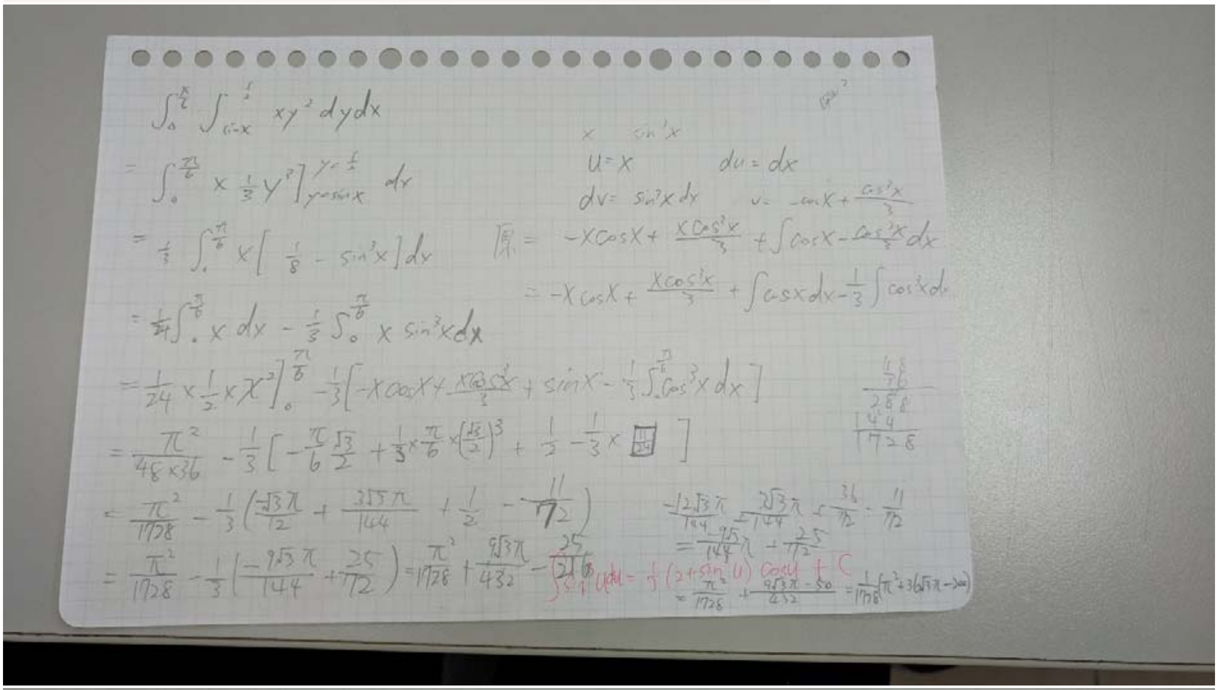
$F_x = e^y + y\cos(xy)$

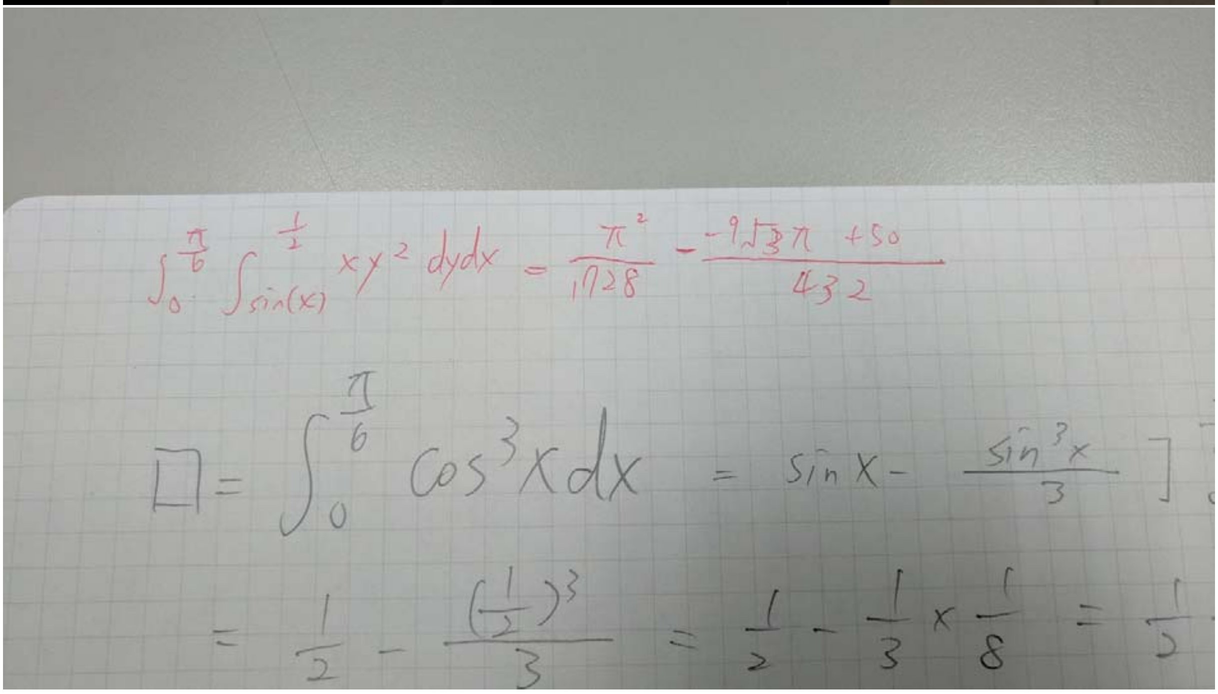
$F_y = xe^y + x\cos(xy) + 1$

7.

After reversing the order of integration we get

$$\int_0^{1/2}\int_0^{\sin^{-1} y} xy^2\, dx\, dy$$





8.

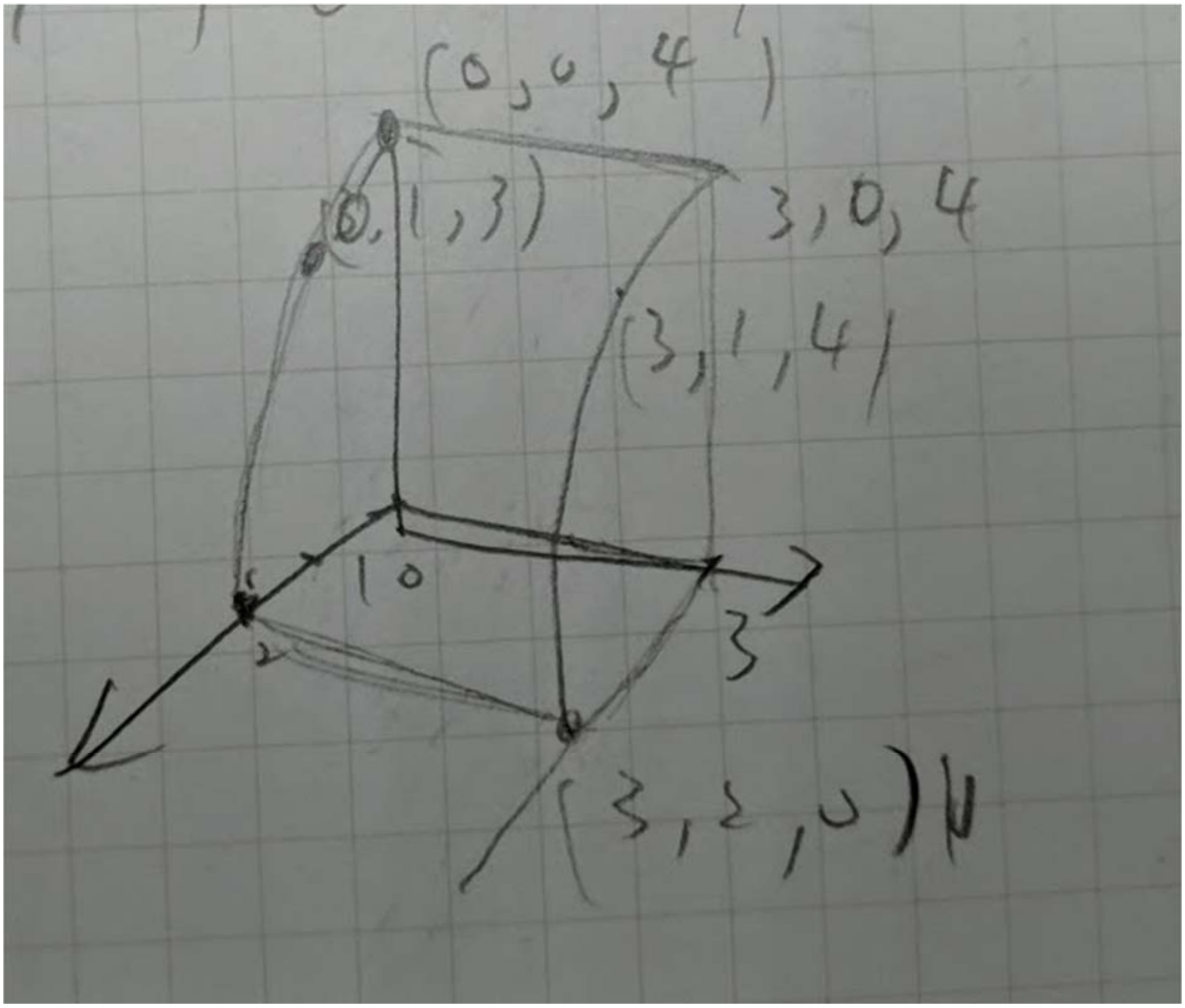
1 $\iint_R f(x,y)dA$

To find the value of double integral ,we must found the area of integration

2 $f(x,y) = 4 - y^2$

the domailn is restricted by the area $\rightarrow x = 3$

3 $\int_0^2 \int_0^3 (4-y^2)dxdy = \int_0^2 \left[4x - y^2x\right]_0^3 dy = \int_0^2 (12-3y^2)dy = \left[12y - y^3\right]_0^2 = 24-8 = 16$

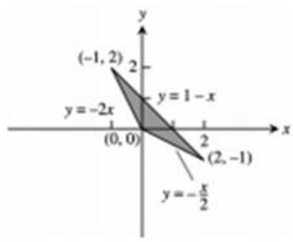


9.

17. $\int_{-1}^{0}\int_{-2x}^{1-x} dy\,dx + \int_{0}^{2}\int_{-x/2}^{1-x} dy\,dx$

$= \int_{-1}^{0}(1+x)\,dx + \int_{0}^{2}\left(1-\frac{x}{2}\right)dx$

$= \left[x+\frac{x^2}{2}\right]_{-1}^{0} + \left[x-\frac{x^2}{4}\right]_{0}^{2} = -\left(-1+\frac{1}{2}\right)+(2-1) = \frac{3}{2}$



10.

22. average $= \frac{1}{(\ln 2)^2}\int_{\ln 2}^{2\ln 2}\int_{\ln 2}^{2\ln 2}\frac{1}{xy}\,dy\,dx = \frac{1}{(\ln 2)^2}\int_{\ln 2}^{2\ln 2}\left[\frac{\ln y}{x}\right]_{\ln 2}^{2\ln 2}dx$

$= \frac{1}{(\ln 2)^2}\int_{\ln 2}^{2\ln 2}\frac{1}{x}(\ln 2+\ln\ln 2-\ln\ln 2)\,dx = \left(\frac{1}{\ln 2}\right)\int_{\ln 2}^{2\ln 2}\frac{dx}{x} = \left(\frac{1}{\ln 2}\right)[\ln x]_{\ln 2}^{2\ln 2}$

$= \left(\frac{1}{\ln 2}\right)(\ln 2+\ln\ln 2-\ln\ln 2) = 1$