Yash Khangura 20000-7720 Final Exam

1. 18
2. $\int_{1/2}^{1}\int_{1/4}^{y^2} f(x,y)\,dx\,dy$
3. $-1/2$
4. ??
5. $A=\pi/3,\ B=2\pi/3,\ C=\pi/3$
6. $-12/\sqrt{3}$
7. $6\cos^2(1)-6\sin(1)\cos(1)$
8. No real answer
9. $5/2$
10. $(3/4,-1)$ is a saddle point
11. 3.0003333
12. $1/3$
13. $\int_0^{2\pi}\int_0^{\pi}\int_0^{2} r^6\sin^4\theta\cos^3\theta\sin\theta\,dr\,d\theta\,d\theta$
14. $1/3$
15. ?
16. 14
17. 0

Sign the following declaration:

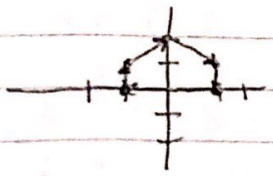
I Hereby declare that all the work was done by myself. I was allowed to use Maple (unless specifically told not to), calculators, the book, and all the material in the web-page of this class but ~~NOT~~ other resources on the Internet.

I only spent (at most) 3 hours on doing the exam. The last 30 minutes were spent in checking and double-checking the answers.

I also understand that I may be subject to a random short chat to verify that I actually did it all by myself.

Signed: [signature]

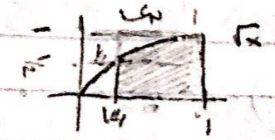
1. $\int_C (\cos(e^{\sin x}) + 5y)\,dx + (\sin(e^{\cos y}) + 11x)\,dy$ (P, Q)



$$\int_C \frac{dQ}{dx} - \frac{dP}{dy} = \int_{-1}^{0}\int_{0}^{x+2} 6\,dy\,dx + \int_{0}^{1}\int_{0}^{2-x} 6\,dy\,dx$$

$$\int_{-1}^{0} 6x+12\,dx + \int_{0}^{1} 12-6x\,dx = 3x^2+12x\Big|_{-1}^{0} + 12x-3x^2\Big|_{0}^{1} = 9+9 = 18$$

2. $\int_{1/4}^{1}\int_{0}^{\sqrt{x}} f(x,y)\,dy\,dx = \int_{1/2}^{1}\int_{y^2}^{1} f(x,y)\,dx\,dy$



3. $2\cos(x+y) + 4\cos(x+z) + 8\cos(y+z) = 7$

$-2\sin(x+y) - 4\sin(x+z) - 4\sin(x+z)\,dz/dx - 8\sin(y+z)\,dz/dx = 0$

$$\frac{dz}{dx} = \frac{2\sin(x+y)+4\sin(x+z)}{-4\sin(x+z)-8\sin(y+z)} = \frac{2\sin(\frac{\pi}{3})+4\sin(\frac{\pi}{3})}{-4\sin(\frac{\pi}{3})-8\sin(\frac{\pi}{2})} \cdot \frac{\sqrt{3}+2\sqrt{3}}{-2\sqrt{3}-4\sqrt{3}}$$

$$= \frac{3\sqrt{3}}{-6\sqrt{3}} = -\frac{\sqrt{3}}{2\sqrt{3}} = -\frac{1}{2}$$

$-2\sin(x+y) - 4\sin(x+z)\,dz/dy - 8\sin(y+z) - 8\sin(y+z)\,dz/dy = 0$

$$\frac{dz}{dy} = \frac{2\sin(x+y)+8\sin(y+z)}{-4\sin(x+z)-8\sin(y+z)} = \frac{\sqrt{3}+4\sqrt{3}}{-2\sqrt{3}-4\sqrt{3}} = \frac{5\sqrt{3}}{-6\sqrt{3}} = -\frac{5}{6}$$

$z - \frac{\pi}{6} = -\frac{1}{2}(x-\frac{\pi}{6}) - \frac{5}{6}(y-\frac{\pi}{6})$

$z = -\frac{1}{2}x - \frac{5}{6}y + \frac{\pi}{12} + \frac{5\pi}{36} + \frac{\pi}{6}$

$z = -\frac{1}{2}x - \frac{5}{6}y + 14\pi/36$

4. $a \times b = \langle 1,1,-1\rangle$ $\quad a\langle 0,1,-1\rangle$

$b \times c = \langle 1,-1,1\rangle$ $\quad b\langle 1,0,1\rangle$

$a \times c = \langle 2,1,2\rangle$ $\quad c\langle 1,-1,2\rangle$

?!?