MATH 252 EXERCISES for MT2

1) Evaluate $\int_0^4 (\int_{\frac{y}{2}}^{1+\frac{y}{2}} \frac{2x-y}{2}\ dx)\ dy$. Use $u = \frac{2x-y}{2}, v = \frac{y}{2}$.

2) Evaluate $\int_0^1 (\int_0^x \sqrt{x+y}.(y-2x)^2\ dy)\ dx$.

3) Show that $\vec{F}(x,y,z)$ is conservative, and then evaluate the following integrals.

a) $\int_{(0,2,1)}^{(1,\frac{\pi}{2},2)} \cos y\ dx + (\frac{1}{y} - 2x\sin y)dy + \frac{1}{z}dz.$

b) $\int_{(1,1,1)}^{(1,2,3)} 3x^2\ dx + \frac{z^2}{y}\ dy + 2z\ln y\ dz.$

4) Use Green's Theorem, evaluate $\oint_C xy\ dx + x^2y^3\ dy$, where C is the triangle with vertices $(0,0), (1,0), (1,2)$ in clockwise.

5) Using double integrals, find the area of R bounded by $x + y^2 = 4$ and $y + 2 = x$.

6) Reverse the order of integration

$$\int_{-2}^{1}\int_{y+2}^{4-x^2} \sin(x^2)\ dx\ dy$$

7) Use transformation $u = 2x + 3y, v = 2y$ to evaluate the area of the ellipse

$$4x^2 + 12xy + 13y^2 = 3$$

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8) Evaluate $\int_C xy\ dx - y^2\ dy + xz\ dz$, where C is the line segment from $(1,1,2)$ to $(0,0,0)$.

9) Let $\vec{F}(x,y,z) = (e^x\cos y + yz)\vec{i} + (xz - e^x\sin y)\vec{j} + (xy+z)\vec{k}$.

a) Show that $\vec{F}(x,y,z)$ is conservative.

b) Find $\int_C \vec{F}.\ d\vec{r}$ where C is the line segments from $(0,0,0)$ to $(1,0,2)$ to $(2,\pi,4)$.