MATH 2043 TEST 3 REVIEW PROBLEMS - SUMMER 2009

12.1: 5, 17, 29, 40, 41, 49, 51

12.2: 5, 10, 13, 19, 23, 27, 31 (in Problems 27 and 31 also find parametric equations of the line), 39

12.3: 1, 9, 13, 21, 25, 29, 41, 49

12.4: 11, 19, 34, 40, 41, 47

12.5: 3, 11, 15, 21, 26, 27, 31

13.2: 17, 34, 37, 41, 42, 49, 53

13.3: 3, 4, 19 (in Problem 19, compute the length of the curve over the interval $0 \leq t \leq \ln 2$)

14.3: 4, 14, 17, 28, 37, 41, 42, 55 (in 55, also compute $\dfrac{\partial^2 g}{\partial y \partial x}$), 63, 68, 69

14.5: 6, 13, 18, 27, 29 (in Problems 27 and 29 also find the direction and rate of maximum increase at the given point), 33, 41

14.6: 11, 13

15.1: 25, 29, 31

15.2: 4, 19, 25, 29, 33, 34, 37, 40, 41

15.3: 5, 13, 23, 25

15.4: 5, 7, 9, 13, 15, 18, 34, 35, 39, 47, 49, 51, 53 (note that in 53, $f(x,y,z) = (x^2+y^2+z^2)^{-3/2}$, 55, 59

Convert into spherical coordinates and evaluate $\displaystyle\int_{-2}^{2}\int_{0}^{\sqrt{4-x^2}}\int_{0}^{\sqrt{4-x^2-y^2}} z\sqrt{x^2+y^2+z^2}\,dzdydx.$

Evaluate $\displaystyle\int\int_D\int e^{-(x^2+y^2+z^2)^{3/2}}\,dV$ where D is the region that lies below the sphere $x^2+y^2+z^2=4$ and above the cone $z=\sqrt{x^2+y^2}$.

16.2: 1, 3, 17-31 odd, 48, 49

16.3: 1, 2, 7, 9, 13, 14, 15, 18

For each vector field $\mathbf{F}$ and a path $\mathbf{c}$ below verify that $\mathbf{F}$ is conservative, find a potential function, and evaluate $\displaystyle\int_{\mathbf{c}} \mathbf{F}\cdot d\mathbf{s}$

(a) $\mathbf{F} = \langle ye^{xy}-y^2, xe^{xy}-2xy+\sin y\rangle$, $\mathbf{c}(t)$ is the straight line segment from the point $(1,0)$ to the point $(0,\pi/2)$.

(b) $\mathbf{F} = \langle 2xyz, x^2z+\dfrac{z}{y^2}, x^2y-\dfrac{1}{y}+2\rangle$, $\mathbf{c}(t) = \langle\sqrt{2t+1}, e^{t^2-t}, \cos(\pi t)\rangle$, $0\leq t\leq 1$.

17.1: 1-7, 9-11, 23