You must show **all** work to receive full credit. All work is to be your own. Oct 19 2020

This is a closed books and notes test. Be organized. Total points: **100** 18:40- 19:55

Submit to BB a single b/w pdf file, named using your last name. emailed solutions won't be graded

1. §10.1 Line Integral. Work done by a force. Evaluate the line integral, where C is the given curve. (Show the details.) 10 points

$$\int_C (y+z)dx + (x+z)dy + (x+y)dz, \;\; C \text{ is the line segment from } (1,0,1) \text{ to } (0,1,2)$$

2. §10.2 Path Independent Integrals. Show the form under the integral sign is exact in space and evaluate the integral. Show the details of your work. 10 points

$$\int_{(0,0,0)}^{(1,1,0)} e^{x^2+y^2+z^2}(x\,dx + y\,dy + z\,dz)$$

3. §10.4 Evaluation of Line Integrals by Green's Theorem.

Using Green's Theorem, evaluate $\boxed{\int\limits_C xy^2\,dx + 2x^2y\,dy}$ counterclockwise around the boundary curve C. Where C is the triangle with vertices $(0,0), (2,2), (2,4)$. 20 points

4. §10.6 Flux Integrals (3) $\iint\limits_S \mathbf{F}\cdot\mathbf{n}\,dA$ Evaluate the integral given below for the following data. Indicate the kind of surface. (Show the details of your work.) 20 points
$\mathbf{F} = [0\,,\,\sin y\,,\,\cos z]$, S the cylinder $x = y^2$, where $0 \le y \le \frac{\pi}{4}$ and $0 \le z \le y$

5. §10.7 Application of the Divergence Theorem: Surface Integrals $\oiint_S \mathbf{F} \cdot \mathbf{n}\, dA$ 20 points

Evaluate the surface integral $\oiint_S \mathbf{F} \cdot \mathbf{n}\, dA$ by the Divergence Theorem. Show the details.

$\mathbf{F} = [\cos z + xy^2,\ xe^{-z},\ \sin y + x^2 z]$, S the surface of the solid bounded by $z = x^2 + y^2$ and the plane $z = 4$.

6. §10.9 Evaluation of $\oint_C \mathbf{F} \cdot \mathbf{r}' \, ds$ 20 points

Calculate this line integral by Stokes's theorem for the given $\mathbf{F}$ and C. Assume the Cartesian coordinates to be right-handed and the z-component of the surface normal to be nonnegative. Show the details.

$\mathbf{F} = [-5y,\, 4x,\, z]$, C the circle $x^2 + y^2 = 16$, $z = 4$