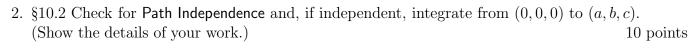
Fall 2020 ENG 5300 Test 1 Dong Ye

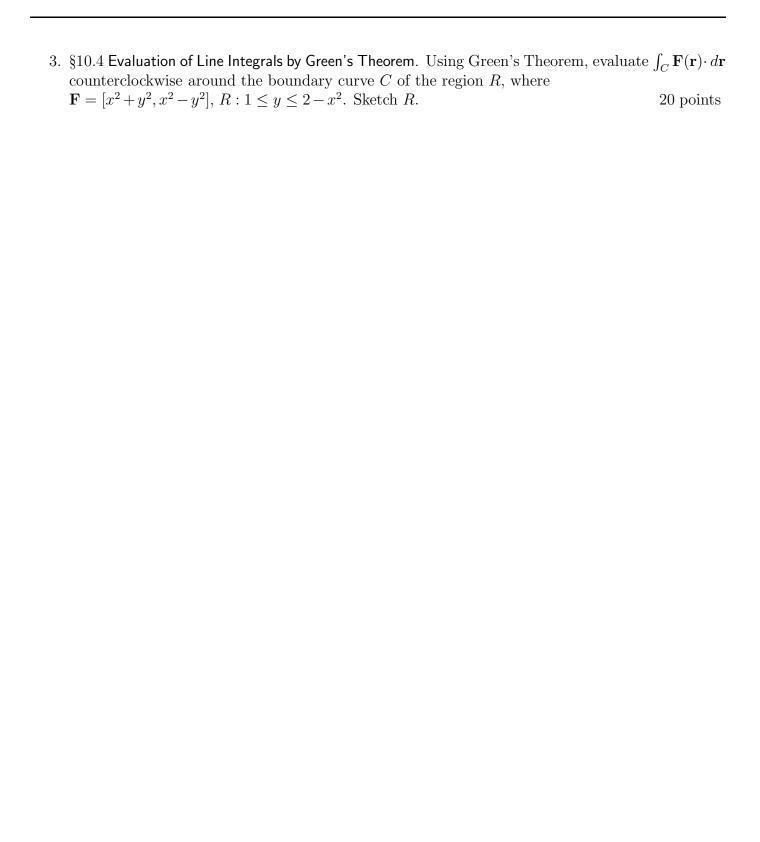
You must show **all** work to receive full credit. All work is to be your own.

Oct 19 2020
This is a closed books and notes test. Be organized. Total points: **100**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. Calculate $\int_C \mathbf{F}(\mathbf{r}) \cdot d\mathbf{r}$ for the following data. If \mathbf{F} is a force, this gives the work done in the displacement along C. (Show the details.) $\mathbf{F} = [z, x, y], \ C : \mathbf{r} = [\cos t, \sin t, t] \text{ from } (1, 0, 0) \text{ to } (1, 0, 4\pi).$



$$(\cos(x^2 + 2y^2 + z^2))(2x dx + 4y dy + 2z dz)$$



4. §10.6 Flux Integrals (3) $\iint_S \mathbf{F} \cdot \mathbf{n} \, dA$ Evaluate the integral given below for the following data. Indicate the kind of surface. (Show the details of your work.) 20 points $\mathbf{F} = [\tan xy, \, x, \, y], \, S: \, y^2 + z^2 = 1, \, 2 \le x \le 5, \, y \ge 0, \, z \ge 0$

- $5.~\S 10.7$ Application of the Divergence Theorem: Surface Integrals $\oiint_{S} {\bf F} \cdot {\bf n} \, dA$
- 20 points

Evaluate the integral by the Divergence Theorem. (Show the details.) $\mathbf{F}=[z-y\,,\,y^3\,,\,2z^3],\quad S$ the surface of $y^2+z^2\leq 4,\,-3\leq x\leq 3$

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.

 $\mathbf{F}=[0,\,z^3,\,0],\,C$ the boundary curve of the cylinder $x^2+y^2=1,\,x\geq0,\,y\geq0,\,0\leq z\leq1$