100	90's	80's	70's	60's	< 60
0	5	4	1	7	5

Assessment 8
Dusty Wilson
Math 254

$\bar{x} = 72\%$
med ≈ 68.28

Name: Key

All truths are easy to understand once they are discovered; the point is to discover them.

Galileo Galilei
1564 - 1642 (Italian mathematician)

No work = no credit
No CAS Calculators

Warm-ups (1 pt each): Expand $(3-2x)^3 = 27 - 54x + 36x^2 - 8x^3$ $\quad 3 \cdot 3^2 \cdot 2x$ $\qquad \infty + \infty = \infty$ OR $\frac{1}{0}$

1.) (1 pt) Please paraphrase the quote by Galileo (above). Answer using complete English sentences.

Hindsight is 20 - 20.

2.) (10 pts) Answer the following:

a.) How do you determine if a vector field is conservative?

check if curl $\vec{F} = 0$.

b.) What does it mean for work to be "independent of path?"

This means the work only depends on the endpoints... not the path between.

c.) Given an example of a conservative vector field

$f(x,y) = 2x + y$
$\vec{\nabla} f = \langle 2, 1 \rangle \leftarrow$ conservative

d.) Give two parameterizations of $y = x^2$ on $1 \le x \le 3$ (make sure to include the domain of the parameter).

$x = t$	$x = e^t$
$y = t^2$	$y = e^{2t}$
$1 \le t \le 3$	$0 \le t \le \ln 3$

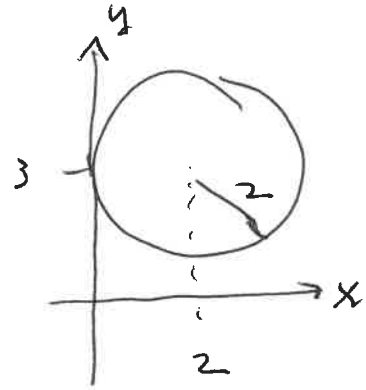
e.) Use Green's Theorem to determine what the line integral $\frac{1}{2}\oint_C -y\,dx + x\,dy$ represents geometrically.

$$\frac{1}{2}\oint_C -y\,dx + x\,dy = \frac{1}{2}\iint_R 1 + 1\,dA = \underbrace{\iint_R 1\,dA}_{\text{represents the area of the region enclosed by } C}$$

represents the area of the region enclosed by C.

3.) (10 pts) Evaluate $\oint_C (6y+x)\,dx+(y+2x)\,dy$ where C is the circle $(x-2)^2+(y-3)^2=4$ traversed counter clockwise.

work =



$$\text{work} = \iint_R 2-6\,dA$$

$$= -4\iint_R 1\,dA$$

$$= -4\cdot\pi\cdot 2^2$$

$$= -16\pi$$

$f_y = 5-3x-y$

$f_y = -3x+g'(y)$

$g'(y) = 5-y$

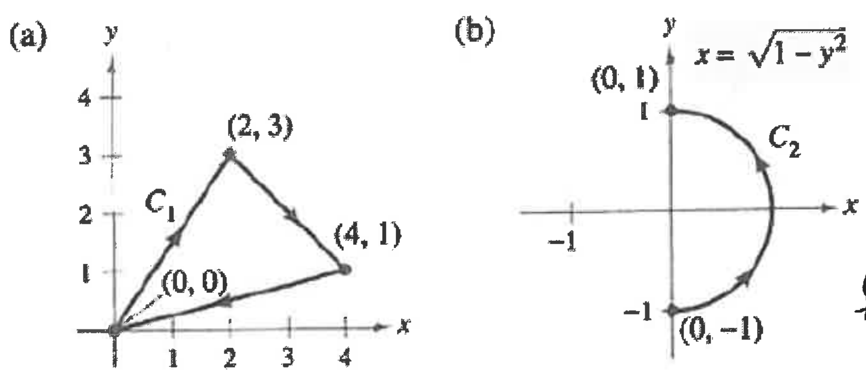
$g(y) = 5y - \frac{1}{2}y^2 + C$

$\frac{\partial}{\partial y}$

4.) (10 pts) Consider $\int_C \underbrace{(2x-3y+1)}_{f_x}\,dx+\underbrace{(5-3x-y)}_{f_y}\,dy$ for the curves C_1 and C_2.

$f_x = 2x-3y+1$

$f = x^2-3xy+x+g(y)$



$f(x,y) = x^2-3xy+x+5y-\frac{1}{2}y^2+C$

a.) Calculate $\int_{C_1} \vec{F}\cdot d\vec{r}$

$\vec{F} = \vec{\nabla} f$ so is conservative so the work = 0.

b.) Calculate $\int_{C_2} \vec{F}\cdot d\vec{r} = f(0,1) - f(0,-1)$

$$= \left(5-\tfrac{1}{2}\right) - \left(-5-\tfrac{1}{2}\right)$$

$$= 10.$$