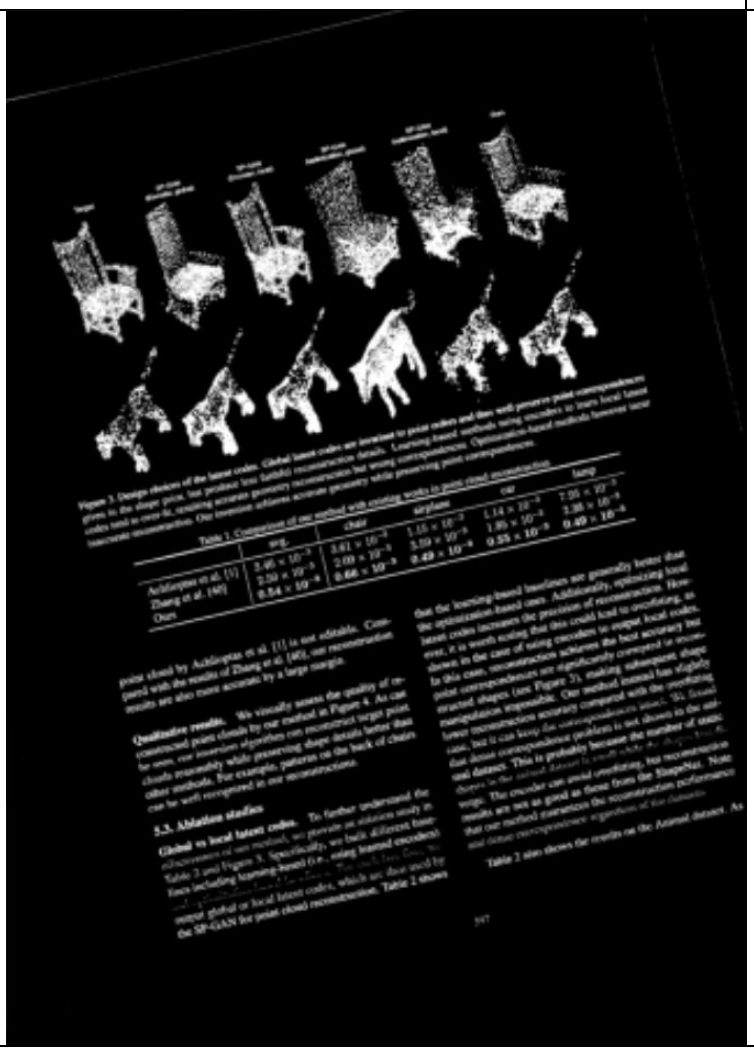
Task 2.3D Answer sheet

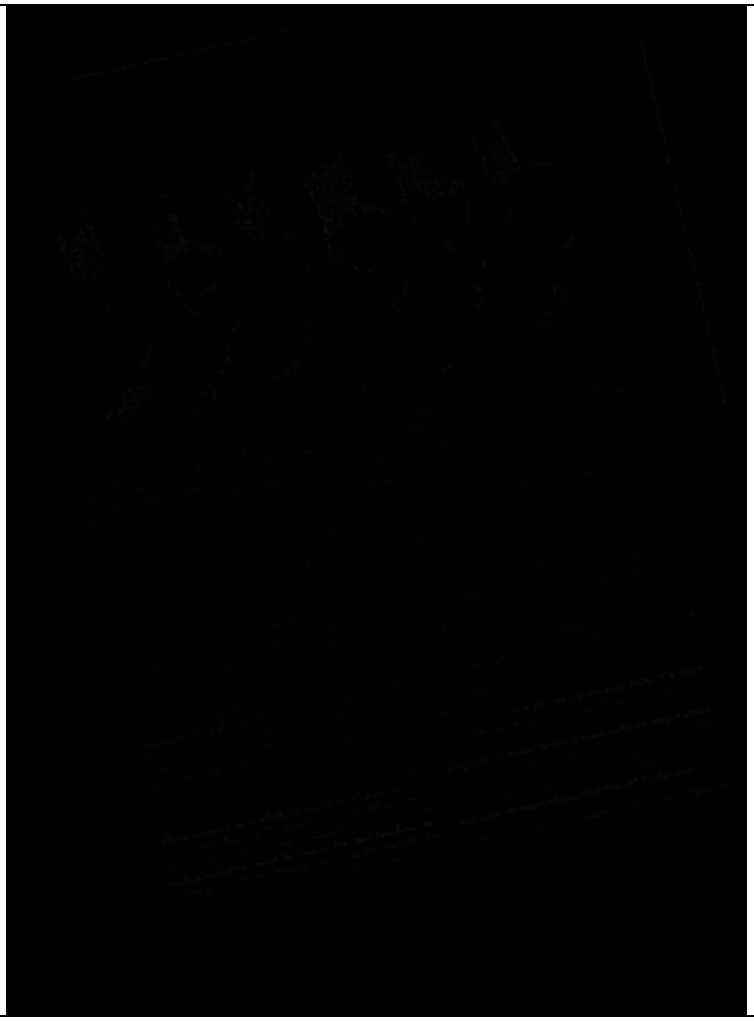
Fill in the "**Results**" column with relevant results

Notes:

- Examples are given for illustration purposes only and need to be replaced by your own results.
- Missing any required results will result in a re-submission.

1. Results of candidate point selection on doc.jpg

	Candidate points	**Computational speed (in calculating candidate points)**
Strategy a		0.001999139785766016 seconds

Strategy b		0.006463527679443359 seconds

Strategy c		0.9639995098114014 seconds

2. Performance analysis

Note: For each setting (i.e., a combination of a point selection strategy and density threshold), you need to fill in the respective cell of the setting with the following information.

- Deskewing result of the setting (i.e., a deskewed image of doc.jpg).
- Computational speed of applying the Hough transform and the entire skew estimation process (from input to output).

	density threshold 1 (10)	**density threshold 2 (15)**	**density threshold 3 (20)**
Strategy a	 Hough time: 0.1670849323272705 seconds Total time: 0.2960667610168457 seconds	 Hough time: 0.18290948867797852 seconds Total time: 0.34273219108581543 seconds	 Hough time: 0.24344778060913086 seconds Total time: 0.37578439712524414 seconds
Strategy b	 Hough time: 0.016517162322998047 seconds Total time: 0.023608684539794922 seconds	 Hough time: 0.01272439956665039 seconds Total time: 0.026520252227783203 seconds	 Hough time: 0.02777266502380371 seconds Total time: 0.055969953536987305 seconds

Strategy c	 Hough time: 0.024947404861450195 seconds Total time: 0.05252861976623535 seconds	 Hough time: 0.015410184860229492 seconds Total time: 0.02565765380859375 seconds	 Hough time: 0.018285512924194336 seconds Total time: 0.03241539001464844 seconds

3. Other test cases

Based on the results in Section 2, choose ONE point selection strategy and ONE density threshold that you find best.

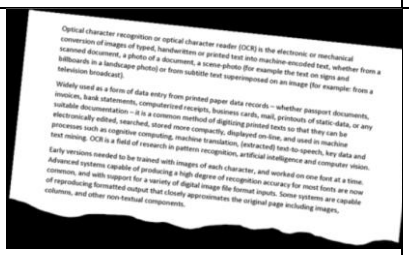
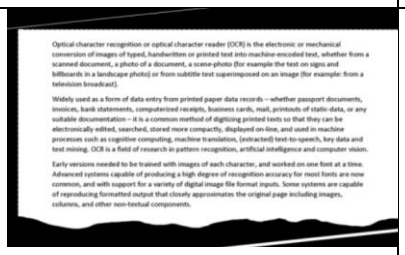
What is your chosen point selection strategy?

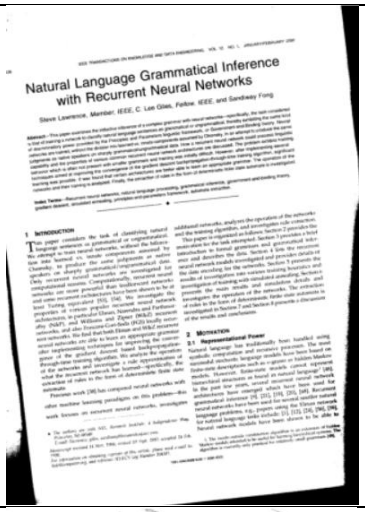
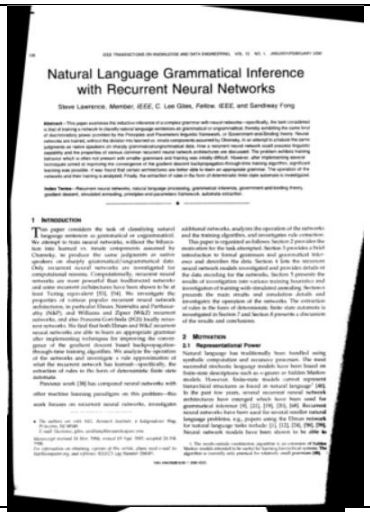
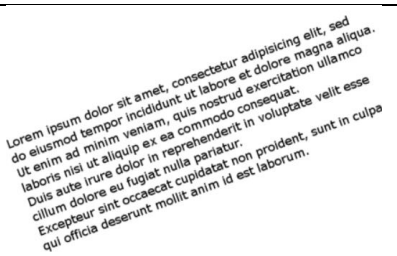
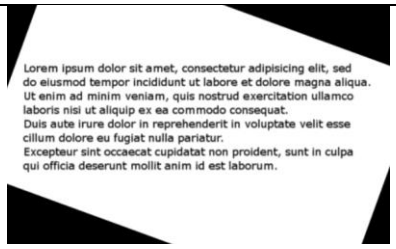
Strategy B

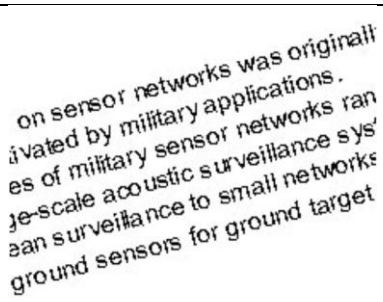
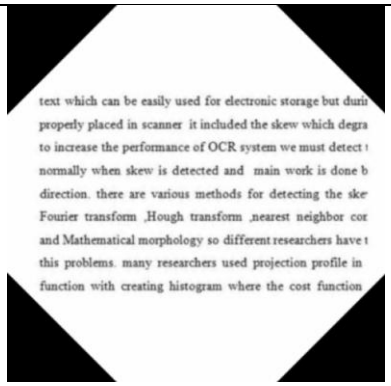
What is your chosen density threshold?

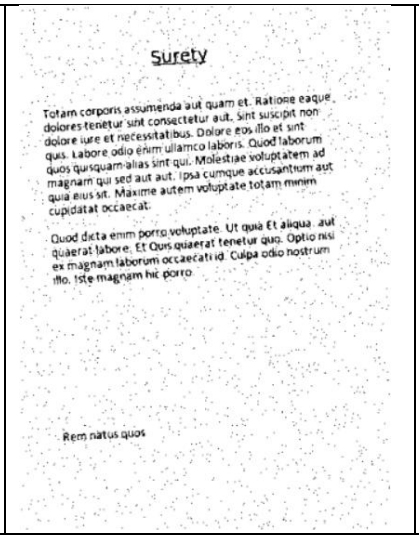
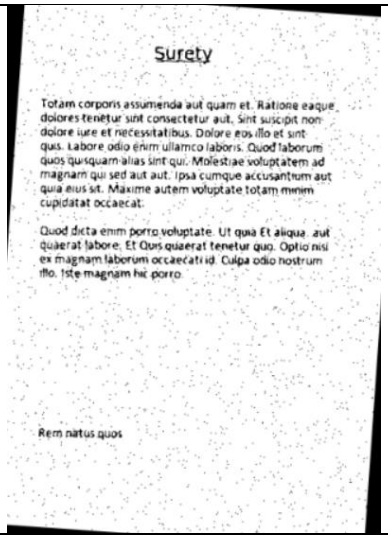
15

Results of other test cases

	Input image	**Output image (deskewed)**	**Computational speed (candidate point selection, Hough transform, entire process)**
Test case 1			Computational speed of candidate points using strategy B: 0.00099849700927734 38 seconds Hough time: 0.00399732589721679 7 seconds Total time: 0.00499820709228515 6 seconds

Test case 2			Computational speed of candidate points using strategy B: 0.00099563598632812 5 seconds Hough time: 0.00258660316467285 16 seconds Total time: 0.00258660316467285 16 seconds
Test case 3			Computational speed of candidate points using strategy B: 0.00299048423767089 84 seconds Hough time: 0.02438545227050781 2 seconds Total time: 0.03911519050598144 5 seconds
Test case 4			Computational speed of candidate points using strategy B: 0.01200747489929199 2 seconds Hough time: 0.01402592658996582 seconds Total time: 0.02253198623657226 6 seconds
Test case 5			Computational speed of candidate points using strategy B: 0.00099825859069824 22 seconds Hough time: 0.00200128555297851 56 seconds Total time: 0.00200128555297851 56 seconds

Test case 6			Computational speed of candidate points using strategy B: 0.00074315071105957 03 seconds Hough time: 0.00123238563537597 66 seconds Total time: 0.00277686119079589 84 seconds
Test case 7			Computational speed of candidate points using strategy B: 0.00076746940612792 97 seconds Hough time: 0.00092864036560058 59 seconds Total time: 0.00150179862976074 22 seconds
Test case 8			Computational speed of candidate points using strategy B: 0.00700354576110839 84 seconds Hough time: 0.01501083374023437 5 seconds Total time: 0.02234220504760742 2 seconds
Test case 9			Computational speed of candidate points using strategy B: 0.00099492073059082 03 seconds Hough time: 0.00100016593933105 47 seconds Total time: 0.00150871276855468 75 seconds

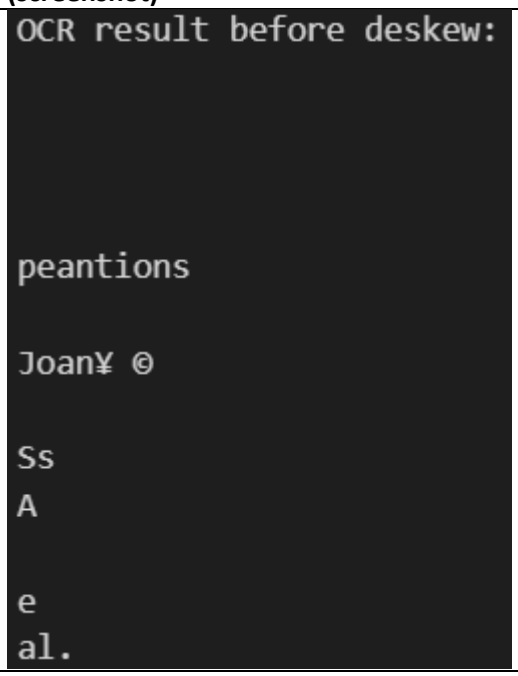
Test case 10			Computational speed of candidate points using strategy B: 0.00100111961364746 1 seconds Hough time: 0.00132513046264648 44 seconds Total time: 0.00132513046264648 44 seconds

Observe and discuss the results. Does the Hough transform accurately work in every case? If not, what could be the reason and how to address it?

In my case, all of the Hough transform work accurately in every cases.

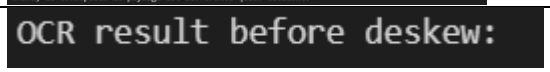
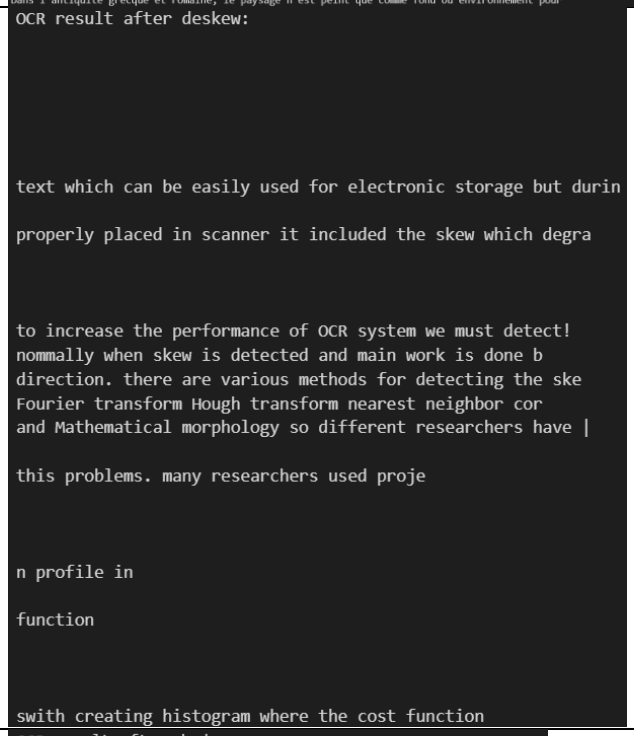
4. Text recognition using pytesseract

Provide screenshots with recognised text highlighted to showcase the effectiveness of skew correction to text recognition.

	Text recognition without skew correction (screenshot)	**Text recognition with skew correction (screenshot)**
doc.jpg		

Test case 1	OCR result before deskew: Photo (for example the text on sig *t superimposed on an image (for es " from subtitle te; ! whether from a ns and xample: from a whether passport documents,	OCR result after deskew: Optical character recognition or optical character reader (OCR) is the electronic or mechanical conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image (for example: from a television broadcast). Widely used as a form of data entry from printed paper data records – whether passport documents, invoices, bank statements, computerized receipts, business cards, mail, printouts of static-data, or any suitable documentation – it is a common method of digitizing printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as cognitive computing, machine translation, (extracted) text-to-speech, key data and text mining, OCR is a field of research in pattern recognition, artificial intelligence and computer vision Early versions needed to be trained with images of each character, and worked on one font at a time. Advanced systems capable of producing a high degree of recognition accuracy for most fonts are now common, and with support for a variety of digital image file format inputs. Some systems are capable of reproducing formatted output that closely approximates the original page including images, columns, and other non-textual components.
Test case 2	OCR result before deskew: 8 cer mre 90 nM nt NON SAAOEDRIATY 228 Natural Language Grammatical Inference with Recurrent Neural Networks Steve Lawrence, Member. IEEE, C. Lee Giles, Fellow. 1EEE, and Sandiway Fong: rads pe aT ea rnc car IE et seca, ve wsk consid earns ma ge er Te on rome anager Oe 7 rtf mn) pee 'pene Fag varnont of GOFOTENS ying eon. Now oe rene we ee onroveared en org rece ne ST cere anne oak pavly great wee ne oT a cay ch OO femal eee ama 2k OTT connor tcl new wn renee ae sr rn wg aa can pacientes me haters gated. 4 fWTRODUETION vas paper corer: He cof classifying ature! ait ees a7 Ey eae sentences Mamata or ergs a gai ee aig ago aH ope gtes rae estar tame to ter neural Se Neithout the Bifste™ oe per engi 2 FOUN rion 2 provide We eyo. Hearned vs, nate so On ae te S ton egy to_preduce the ponents ae nate ree ornal pears Grammatical nie Speakers on sharply asl /unqrarsee ino deserves the a na an tnt the Feces speak great eM at ammigated for neural re models vestgned 238 provides details oF Crpatabonal rear' oa nay CUE MEN rea oti ee See peor presents Ne compare ore more powertll may een networks cee of moet ito varies IN pears a8 neo pcurren reset "pee shown toe 2 ce igation of taining wit ar ek aealing SCHON	OCR result after deskew: TRANSACTIONS ON KNOWLEDOE ANG DATA ENGINEERING. VOL 12, NO. ere Natural Language Grammatical Inference with Recurrent Neural Networks Steve Lawrence, Member, IEEE, C. Lee Giles, Fellow, IEEE, and Sandiway Fong [Abstract—Ths pape examina te induclva nore of complex grammar wit eur natwons-epocticay, te tsk considered *Sitar of vaning« retwort to casi natrlangatesectnces as graratcal or ungrammatcal Drereby exting the same kind of acrmaatery power growed by the rotiee and Parameters ings tamewotk ot Goverment and ewsrg theory. Neu 'etworks ar waned, winout he vison mo teamed vs nale components assumed by Chomsky, nb alert to produce he ame fuagmonte as nave apenas cn sharply grammmancatuegrarsmabcal daa. How a recur neva netecrk cus possess Mgusie Capabiy andthe properties of vavove common recurs ura ratwork archlectiven are dcusced. Te problem exis Waning tenavor whch 2 len not present wah emaber ramare a Waring wes may feu However, ater implementing several fecheiques med at ungrovng te convergence Otte graent descent backpropagatonthrcuvime vaning oigatty, riicant tearung was posse i was found that oeran erchaectures oe bse abo 1 lam an appropriate grammar. The Opera Of he senor and tev tracing analyzed. Fal, the eracton fr i he form determinate estgaied Icon Terme— Recurrent naurl networks, natal nguage process, grime! ference, goverment anébindng Meer. {raientdescere,smulated anneaing, prinopis-and-parameters IarhrwX.aulomata exFarPEn, 1 Irroputlon ss paper considers the task of classifying natural language sentences as grammatical or ungratmanatical We attempt to train neural networks, without the bifurea
Test case 3	OCR result before deskew:	OCR result after deskew: entation viewed in terms of rows and columns. Tag = 274 (112.H) Type = SHORT Count = 1 Default = 1 1 = The Oth row is at the visual top of the image, and the Oth column is the visual left-hand side. 2 = The Oth row is at the visual top of the image, and the Oth column is the visual right-hand side. 3 = The Oth row is at the visual bottom of the image, and the Oth column is the visual right-hand side. 4 = The Oth row is at the visual bottom of the image, and the Oth column is the visual left-hand side. 5 = The Oth row is the visual left-hand side of the image, and the Oth column is the visual top. 6 = The Oth row is the visual right-hand side of the image, and the Oth column is the visual top. 7 = The Oth row is the visual right-hand side of the image, and the Oth column is the visual bottom. 8 = The Oth row is the visual left-hand side of the image, and the Oth column is the visual bottom. Other = reserved SamplesPerPixel The number of components per pixel. Since this standard applies to RGB and YCbCr images, the value set for this tag is 3. In JPEG compressed data a JPEG marker is used instead of this tag. Tag = 277 (115.H) Type = SHORT Count = 1 Default = 3 PlanarConfiguration Indicates whether pixel components are recorded in chunky or planar format. In JPEG compressed files a JPEG marker is used instead of this tag. If this field does not exist, the TIFF default of 1 (chunky) is assumed.

Test case 4	OCR result before deskew:	OCR result after deskew: codes tend to over-fit, resulting accurate geometry reconstruction but wrong c inaccurate reconstruction. Our inversion achieves accurate g 1ape prior, but produce less faithful reconstruction details. Learning-based methods using hod with existir encoders to learn local latent orespondences. Optimization-based methods however incur
Test case 5	OCR result before deskew:	OCR result after deskew: } Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed | do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.
Test case 6	OCR result before deskew:	OCR result after deskew:
Test case 7	OCR result before deskew:	OCR result after deskew: ‘on sensor networks was origit ivated by military applications. s of military sensor networks Fz je-scale acoustic surveillance sy an surveiance to small network round sensors for ground target a

Test case 8		OCR result after deskew: Paysage dans l'art | La notion de paysage dans I'art englobe la représentation des paysages par les différents arts : peinture, le dessin, la photographie, etc.| | La représentation du paysage joue un (dle important dans les arts graphiques. Elle peut, entre autres, s'opposer parfois G la représentation des êtres, ou bien peut être utilisée pour les symboliser (peinture religieuse). En peinture, le paysage est un genre aux cétés de la peinture d'histoire, du portrait, de la peinture de genre, de la nature morte et de la peinture figurative. L'importance du paysage dans la Chine Traditionnelle Le paysage a joué un réle majeur dans "histoire et principalement dans la chine traditionnelle. En Chine, la conception du paysage est différente qu'en occident. Les peintres chinois ont leurs propres langages : vide, vide médian, plein, souffle, (voir livre de Francois Cheng). | Estampe chinoise peinte sur un éventail. On peut observer G gauche deux individus dont un 4 cheval. Ces derniers se rendent probablement 4 leur maison familiale qui se situe tout 4 droite de l'estampe. | Si l'on observe attentivement une peinture, une estampe chinoise, on remarquera que souvent, un, OU plusieurs personnages y figurent. Ces derniers sont peints trés petits, par rapport au paysage. Ils sont souvent peints au milieu de la toile (mais pas toujours). Ainsi, le spectateur qui observera la toile, aura limpression d'étre a la place du persgnnage et de pouvoir bénéficier de la vue de celui-ci. Tel est effet voulut par les peintres chinois. | | Histoire du paysage en peinture-Occident-De I'Antiquité au Moyen Age Paysage de I'Odyssée dans la Maisdn de la via Graziosa, I'" siécle av. J.-C. Dans l'antiquité grecque et romaine, le paysage n'est peint que comme fond ou environnement pour
Test case 9		
Test case 10