Maggie Johnson CS109

Mid-Term Exam

THE STANFORD UNIVERSITY HONOR CODE

A. The Honor Code is an undertaking of the students, individually and collectively:

(1) that they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading;

(2) that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.

B. The faculty on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid as far as practicable, academic procedures that create temptations to violate the Honor Code.

C. While the faculty alone has the right and obligation to set academic requirements, the students and faculty will work together to create optimal conditions for honorable academic work.

I acknowledge and accept the honor code:

Signature: _____

NAME (print): _____

1) ____ 25 2) ____ 25 3) ____ 25 4) ____ 25 Total: _____

NOTE: Always show your work as partial credit will be given; this is an **open-note** (but no textbooks) exam; you have 90 minutes.

Logic

1) (25 points) Is $\forall x, W(x) \rightarrow Y(x)$ equivalent to $\forall x, W(x) \wedge Y(x)$? Is $\forall x, W(x) \rightarrow Y(x)$ equivalent to $\exists x, W(x) \wedge Y(x)$? Please provide detailed answers.

Proofs

2) (25 points) Prove or disprove: For any integer a, (a^2 - 2) is not divisible by 4.

Definition of divisibility: If n and d are integers and d != 0, then n is divisible by d, if n = d * k for some integer k; this is denoted d | n ("d divides n").

Induction

3) (25 points) Prove using induction:

$n^2 - 1$ is divisible by 8 whenever n is an odd positive integer.

(Dont’ forget the six steps!)

Combinatorics

4) (25 points) A concert promoter has 1000 unreserved seats to distribute freely among alumni, students, faculty and the public. For example, one possibility is to give half to the students and half to the faculty. How many possibilities are there? (Map this to a problem you know…)