QUIZ 1: <u>60 Minutes</u>

Last Name: _____

First Name: _____

RIN: _____

Section: _____

Answer **ALL** questions.

NO COLLABORATION or electronic devices. Any violations result in an F.

NO questions allowed during the test. Interpret and do the best you can.

GOOD LUCK!
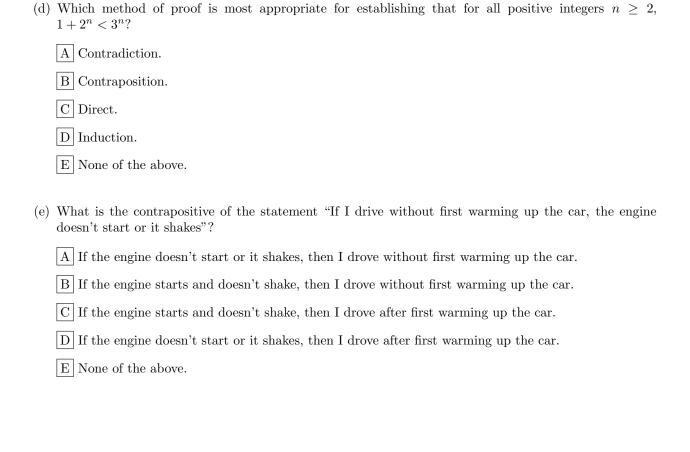
You **MUST** show **CORRECT** work to get full credit.

When in doubt, TINKER.

1	2	3	Total
100	**25**	**25**	**150**

1 Circle one answer per question. 20 points for each correct answer.

(a) Identify the converse of the statement "If I have time and I am not too tired, then I will go to the gym".

A If I will not go to the gym, then I have time and I am not too tired.

B If I will not go to the gym, then I do not have time or I am too tired.

C If I will not go to the gym, then I do not have time and I am too tired.

D If I will go to the gym, then I have time and I am not too tired.

E None of the above.

(b) Which type of proof is most appropriate to establish that the product of an irrational number and a rational number is irrational?

A Direct.

B Contraposition.

C Induction.

D Contradiction.

E None of the above.

(c) Which of the following claims are true?

(1) $\neg(\forall x : P(x)) \overset{eqv}{\equiv} \exists x : \neg P(x)$
(2) $P(x) \vee Q(x) \vee \neg P(x) \overset{eqv}{\equiv} Q(x)$
(3) $p \rightarrow q \overset{eqv}{\equiv} \neg q \vee p$

A (1).

B (1) and (2).

C (1) and (3).

D (2).

E (2) and (3).

(d) Which method of proof is most appropriate for establishing that for all positive integers $n \geq 2$, $1 + 2^n < 3^n$?

A. Contradiction.

B. Contraposition.

C. Direct.

D. Induction.

E. None of the above.

(e) What is the contrapositive of the statement "If I drive without first warming up the car, the engine doesn't start or it shakes"?

A. If the engine doesn't start or it shakes, then I drove without first warming up the car.

B. If the engine starts and doesn't shake, then I drove without first warming up the car.

C. If the engine starts and doesn't shake, then I drove after first warming up the car.

D. If the engine doesn't start or it shakes, then I drove after first warming up the car.

E. None of the above.

2   Let x, y, a be positive numbers with $x \le y$. Prove that

$$\frac{x + a}{y + a} \ge \frac{x}{y}.$$

3 Prove that the sum of any five consecutive natural numbers is divisible by 5.

SCRATCH

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