MCINTYRE MATHS · MATHEMATICS EXTENSION 2

Practice worksheet

Lesson 4 · Proof by contrapositive and contradiction

Name: _____ Date: _____

Contrapositive

1. For integers n, prove by contrapositive that if $3n + 2$ is odd, then n is odd.

2. For integers a and b, prove by contrapositive that if $a + b \geq 101$, then $a \geq 51$ or $b \geq 51$.

Contradiction

3. Given that $\sqrt{2}$ is irrational, prove by contradiction that $1 + \sqrt{2}$ is irrational.

4. Prove that there are no integers m and n such that $12m + 9n = 1$.

5. Prove that there is no smallest positive rational number.

6. Given that if n^2 is divisible by 5 then n is divisible by 5, prove by contradiction that $\sqrt{5}$ is irrational.

HSC-style

7. Adapted HSC-style. Let n be an integer.

(i) Prove by contrapositive that if n^3 is even, then n is even. **(2 marks)**

(ii) Hence prove by contradiction that $\sqrt[3]{2}$ is irrational. **(2 marks)**