AST 250 Spring 2010
EXAM #2

Please write answers on these pages. No calculators. No Notes.

NAME:

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(1) The Arecibo radio telescope, located in Puerto Rico (latitude = 18^d 20') was the largest telescope in the world (D = 305m). It is so large, that the primary mirror is fixed and does not move. Tracking of astronomical sources is achieved by moving the secondary over a limited range that is $+20^d$ and -19^d from zenith. Which of the following objects are observable with Arecibo? (Explain why or why not – e.g. draw a picture or do a calculation).

Whirlpool Galaxy M51	13h 29m 52.7s	$+47^d$ 11' 43"
Orion Nebula M42	05h 35m 17.3s	-05^d 23' 28"
IRC+10216	09h 47m 57.4s	$+13^d$ 16' 44"
Ring Nebula M57	18h 53m 35.1s	$+33^d$ 01' 45"
Triangulum Galaxy M33	01h 33m 50.0s	$+30^d$ 39' 37"

(2) A star with an apparent visual magnitude of m_V = +10.0 mag is observed over the course of a year to have a parallax of θ = 0.01". What is the star's absolute visual magnitude (M_V)?

(3) A star is observed that is 64 times more luminous than the Sun with a diameter that is twice the diameter of the Sun. What is the effective temperature of the star (Hint T_{sun} ~ 5800 K) ?

(4) Write down the nuclear reactions of the p-p I chain. Indicate which step is the slowest and which step is the fastest? What two processes must occur to initiate the p-p I chain?

(5) Jupiter has approximately 1/1000 the mass of the Sun contained within approximately 1/1000 the size of the Sun. What is the ratio of gravitational potential energy of Jupiter compared to the Sun?