Preliminary Problem on Transit method

Earth receives 1370 W/m^2 bolometric flux from the Sun. Bolometric flux is flux across all the wavelengths. For zero magnitude, the bolometric flux is defined as 2.51802×10^{-8} W/m^2

A space probe is at a distance of 50 AU from the Sun and is observing it.

a) Estimate the flux received by the space probe. Estimate the bolometric magnitude of the Sun.

b) Estimate the angular size of the Sun from the space probe.

c) The radius of Jupiter is 69911 km and orbits the Sun at a distance of 5.2 AU. Estimate the angular size of Jupiter as seen by the space probe.

d) Estimate how much part of the Sun will be covered by Jupiter as seen by the space probe?

e) Neglecting the emissions by the Jupiter, estimate how much would be change in magnitude due to transit of Jupiter in front of the Sun.

f) Calculate this for transit of the Earth in front of the Sun.

g) Repeat all calculations for space probe at a distance of 1pc.