Review Problems for Final Exam - Brief Answers
Answers should be right, but see me if you disagree.

1. a) To the right.   b) The force is half as big.

2. a) Region 3   b) No.

3. 2.7×10^{15}

4. a) 5.5×10^{14} oscillations per second   b) $E_0 = 3300$ N/C

5. a) 3.0×10^{-19} J = 1.9 eV   b) 1.055×10^{-34} J·s

6. Intuition would say that the speed of light measured by an observer on the earth would be 3.35×10^8 m/s.

7. F is up.

8. a) 2.8 A   b) 5.6 V
    c) 1.55 A   d) 6.22 V

9. 528 nm

10. a) Because of difference in distances from sources to screen, waves interfere constructively and destructively resulting in bright and dark regions. Since light is an electromagnetic wave, it is the E and B fields that are cancelling.
    b) Photons have certain probability of going to various regions on the screen. Probability is highest at the center of a bright region and lowest at the center of a dark region.

11. a) Angle of refraction = 32.7º   b) 61º
    c) No. Yes if angle of incidence is greater than 61º.

12. Image is inside the sphere, 1.67 cm from the surface of the sphere. Image is upright and 1/3 the size of the object.

13. a) 9.5×10^{-15} N   b) r = 5.0 cm

14. a) 0.005643 mm   b) 0.004º

15. a) 0.5, 1.5, 2.5, 3.5
    b) 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0
    c) 0.25, 0.75, 1.25, 1.75, 2.25, 2.75, 3.25, 3.75
    d) #1

16. a) none   b) CCW

c) CCW   d) none
e) CCW   f) CCW
g) CCW   h) CW

17. a) 0.01 T·m^2 b) 1 V
    c) 33 A

18. a) 4.2×10^6 N/C, 11° to the right of up b) 5.0×10^6 V
    c) 12540 N opposite direction of $\vec{E}$ d) 15,000 J

19. a) 3   b) 0.26 mm

20. a) Consider Huygen wavelets.   All wavelets from the bottom half of the slit are ½ a
wavelength out of phase with the corresponding wavelets from the top half of the slit.
    b) 2 times the wavelength.