PHYS 1004
INTRODUCTORY ELECTROMAGNETISM AND WAVE MOTION
2013 Winter Term

Answers to Assigned Problems for Tutorial #4:
Electric Potential and Potential Energy, Capacitance, Current and Resistance

1. $-0.90\ \mu$J

2. 40 nC, -10 nC

3. a) 0 V/m
   b) 200 V/m

4. a) +5 V/m
   b) -10 V/m
   c) +5 V/m

5. a) 12 pF
   b) 1.2 nC

6. $\frac{U_{C1}}{U_{C2}} = \frac{1}{2}$

7. a) 150 pF
   b) 12 kV

8. 37 μF

9. $Q_1 = 4\ \mu$C, $V_1 = 1$ V
   $Q_2 = 12\ \mu$C, $V_2 = 1$ V
   $Q_3 = 16\ \mu$C, $V_3 = 8$ V

10. $Q_1 = 0.83$ mC, $V_1 = 55$ V
    $Q_2 = 0.67$ mC, $V_2 = 33$ V
    $Q_3 = 0.67$ mC, $V_3 = 22$ V

11. a) 6.6×10^{15} Hz
    b) 1.0 mA

12. a) 120 C
    b) 0.45 mm

13. 1.4 Ω m

14. a) $\vec{E} = \frac{I}{4\pi\sigma r^2}\hat{r},\ a \le r \le b$
    b) $E(r = a = 1.0\text{ cm}) = 3.3 \times 10^{-4}$ V/m
    $E(r = b = 2.5\text{ cm}) = 5.4 \times 10^{-5}$ V/m

15. a) $10\ e^{-t/(2.0\text{ s})}$ A
    b) 10 A

16. $I = 2.0$ A, $v_d = 5.0 \times 10^{-5}$ m/s

17. 7.3 mm

18. $2R$

19. a) 4.9×10^5 A
    b) decrease
    c) 1.1×10^{-5} J

20. a) 2.5 C
    b) 1.8 cm