Hints for 10.7 and 10.8

1. For part a, you can use either the ratio test or root test (if the later, recall a common limit in 10.1). For part b, note that

$$3 \cdot 6 \cdot 9 ... \cdot (3n) = (3 \cdot 1) \cdot (3 \cdot 2) ... (3 \cdot n) = 3^n n!$$

2. Use the formula in class to calculate the coefficient. Just be careful when the generated point is not 0

3. Calculate several derivatives of $f(x)$ (up to order 3,4,5 at least) and look for a pattern.
In general $f^n(x) = \frac{n!}{x^{n+1}}(-1)^{n+1}$ (an easy way to look for the pattern is to check the pattern of the positive part first and then see how the sign change)
Therefore the Taylor series generated at $x = -1$ is

$$\sum_{n=0}^{\infty} (x+1)^n$$

4. a. Differentiate the power series term by term and use theorem 21 of 10.7.

b. Substitution and theorem 20 of 10.7.

c. They should be different by multiplication by 2

d. First write down the power series for that function using substition and then differentiate once and twice to calculate the first 2 coefficients of the Maulaurin series.
In section 10.9, you are to learn that when the Taylor series converges, it converges to the same function and therefore the aforementioned differentiation step is unnecessary.