1. \( f'(x) = 4(x^2 - 3x + 4)^3(2x - 3), \)

2. \( f'(x) = x^23(x^3 - 2x + 1)^2(3x^2 - 2) + 2x(x^3 - 2x + 1)^3, \)

3. \( f'(x) = \frac{(2x + 1)2xe^{x^2} - 2e^{x^2}}{(2x + 1)^2} + \frac{2}{x}, \)

4. \( f'(x) = 3(x^2 - e^{-x^2})^2(2x + 2xe^{-x^2}). \)

5. \( y' = -2xe - x^2/2. \) Even function. Maximum at (0, 2). Only y-intercept at (0, 2). Horizontal asymptote: \( y = 0. \) \( y'' = 2e - x^2/2(x^2 - 1). \) Points of inflection at \( (\pm 1, 2e-1/2) \simeq (\pm 1, 1.213). \) Graph is to the left below.

6. \( y' = \frac{2x}{x^2 + 1}. \) Even function. Minimum at (0, 0). Only intercept at (0, 0). No asymptotes. 
\( y'' = \frac{2(1 - x^2)}{(x^2 + 1)^2}. \) Points of inflection at \( (\pm 1, \ln(2)) \simeq (\pm 1, 0.693). \) Graph is to the right above.
7. a. \( P_1 = 510, \ P_2 = 552, \) and \( P_3 = 536. \)

b. A sketch of \( H(P) \) and the identity function are below. Only intercept is \((0,0)\). Horizontal asymptote: \( P_{n+1} = 0 \). Maximum at \((250,625)\).

c. The equilibria are \( P_e = 0 \) and \( 250(\sqrt{10} - 1) \approx 540.6 \). At \( P_e = 0, \ H'(0) = 10 > 1, \) which means the solution grows monotonically away from the equilibrium, so is unstable. At \( P_e = 250(\sqrt{10} - 1), \ H'(250(\sqrt{10} - 1)) = 0.2\sqrt{10} - 1 \approx -0.37, \) which means the solution oscillates, but approaches the equilibrium, so is stable.

8. a. \( P_1 = 241.1, \ P_2 = 249.8, \) and \( P_3 = 248.7. \)

b. A sketch of \( H(P) \) and the identity function are below. Only intercept is \((0,0)\). Horizontal asymptote: \( P_{n+1} = 0 \). Maximum at \((500/3,625(3/4)^{3/2}) \approx (166.7, 263.7)\).

c. The equilibria are \( P_e = 0 \) and \( 500(5^{1/4} - 1) \approx 247.7. \) At \( P_e = 0, \ H'(0) = 5 > 1, \) which means the solution grows monotonically away from the equilibrium, so is unstable. At \( P_e = 500(5^{1/4} - 1), \ H'(500(5^{1/4} - 1)) = (4 \cdot 5^{3/4} - 15)/5 \approx -0.325, \) which means the solution oscillates, but approaches the equilibrium, so is stable.