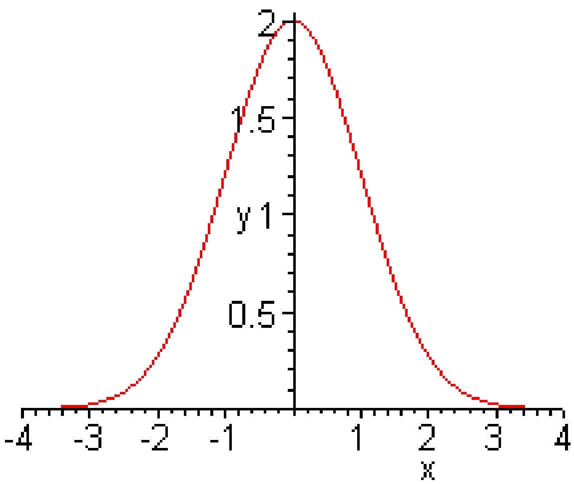
1. $f'(x) = 4(x^2 - 3x + 4)^3(2x - 3)$,

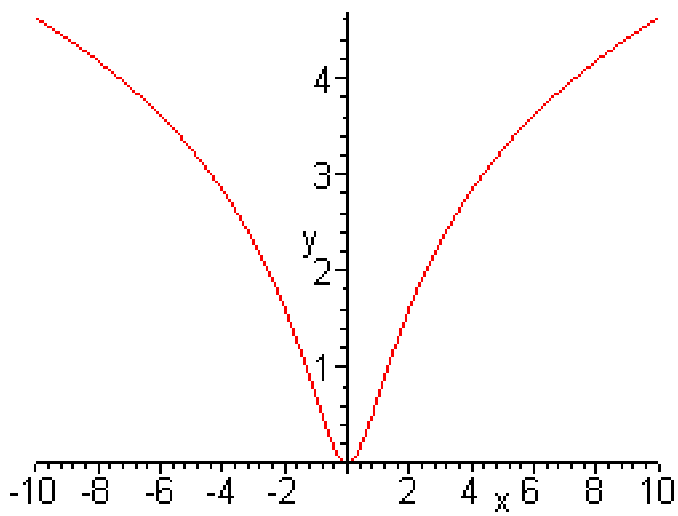
2. $f'(x) = x^2 3(x^3 - 2x + 1)^2(3x^2 - 2) + 2x(x^3 - 2x + 1)^3$,

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

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.



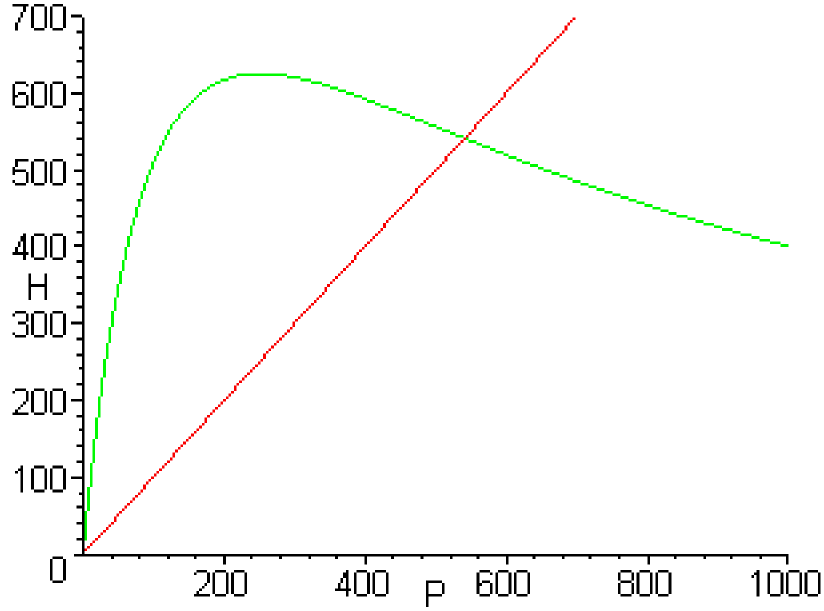


6. $y' = \dfrac{2x}{x^2+1}$. Even function. Minimum at $(0, 0)$. Only intercept at $(0, 0)$. No asymptotes. $y'' = \dfrac{2(1-x^2)}{(x^2+1)^2}$. Points of inflection at $(\pm 1, \ln(2)) \simeq (\pm 1, 0.693)$. Graph is to the right above.

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 $250(\sqrt{10} - 1) \simeq 540.6$. At $P_e = 0$, $H'(0) = 10 > 1$, which means the solution grows monotonically away from the equilibrium, so is unstable. At $P_e = 250(\sqrt{10}-1)$, $H'(250(\sqrt{10}-1)) = 0.2\sqrt{10}-1 \simeq -0.37$, 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 $(500/3, 625(3/4)^3) \simeq (166.7, 263.7)$.

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