EXERCISE SHEET 11

WRITTEN SOLUTIONS OF EXERCISES 1.15 AND 2 TO BE PRESENTED ON 11/12

Exercise 1. Find the Taylor polynomial of degree 4 of the following functions f, based at the corresponding points x_0:

(1) $f(x) = \ln(x)$ $x_0 = 1$;
(2) $f(x) = \ln(x)$ $x_0 = 2$;
(3) $f(x) = 1/x$ $x_0 = 2$;
(4) $f(x) = \dfrac{1}{1+x}$ $x_0 = 0$;
(5) $f(x) = \ln(1+x)$ $x_0 = 0$;
(6) $f(x) = \sin(x)$ $x_0 = 0$;
(7) $f(x) = \cos(x)$ $x_0 = 0$;
(8) $f(x) = \sin(x)$ $x_0 = \pi/4$;
(9) $f(x) = \sin(\pi x)$ $x_0 = 1/2$;
(10) $f(x) = x^4 + x + 2$ $x_0 = 1$;
(11) $f(x) = \dfrac{1}{1+x^2}$ $x_0 = 0$;
(12) $f(x) = \arctan(x)$ $x_0 = 0$;
(13) $f(x) = (x-1)e^x$ $x_0 = 1$;
(14) $f(x) = \sin^2(x)$ $x_0 = 0$;
(15) $f(x) = xe^{-x}$ $x_0 = 0$;
(16) $f(x) = (x-1)e^{1-x}$ $x_0 = 1$;
(17) $f(x) = x^{1/3}$ $x_0 = 1$;
(18) $f(x) = \ln\left(\dfrac{1+x}{1-x}\right)$ $x_0 = 0$; (*Hint: use the properties of the logarithm first.*)

Exercise 2. Which of the following functions can be the Taylor approximation of degree 2 for the function $f(x)$ (pictured in black) at $x_0 \sim -1.6$? Justify the answer.