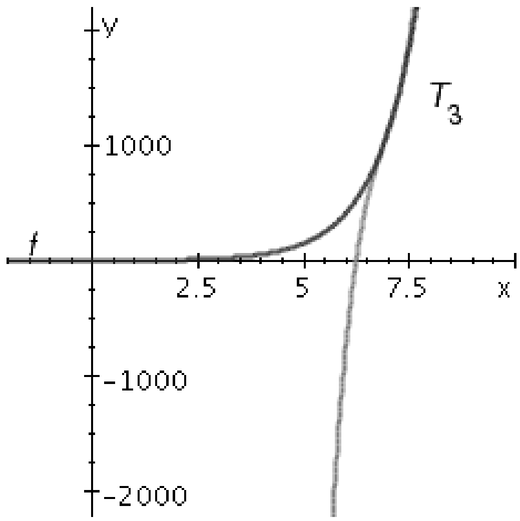
Name: ___________________ Class:___ Date: ______________

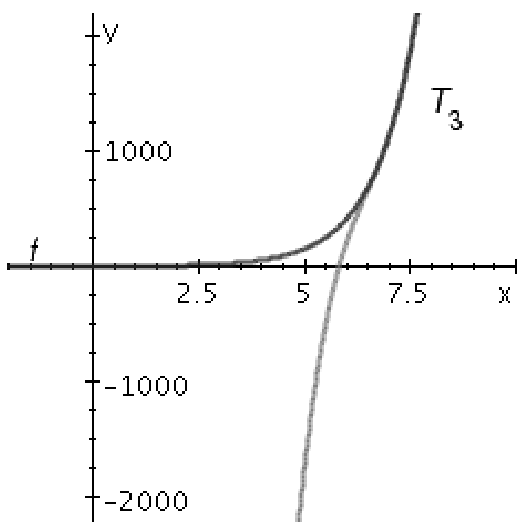
1 Find the Taylor polynomial $T_n(x)$ for the function *f* at the number *a*. Graph *f* and T_n on the same screen.

$f(x) = e^x$, $a = 7$, $n = 3$

a. $T_3 = e^7 + e^7(x - 7) + \frac{e^7}{2}(x - 7)^2 + \frac{e^7}{6}(x - 7)^3$



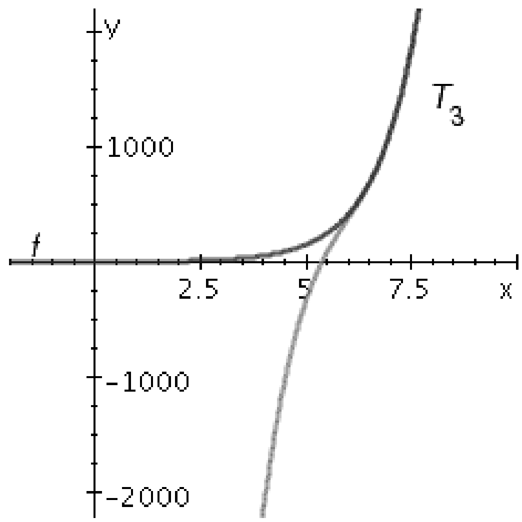
b. $T_3 = e^7 + e^7(x - 7) + \frac{e^7}{2}(x - 7)^2 + \frac{e^7}{6}(x - 7)^3$



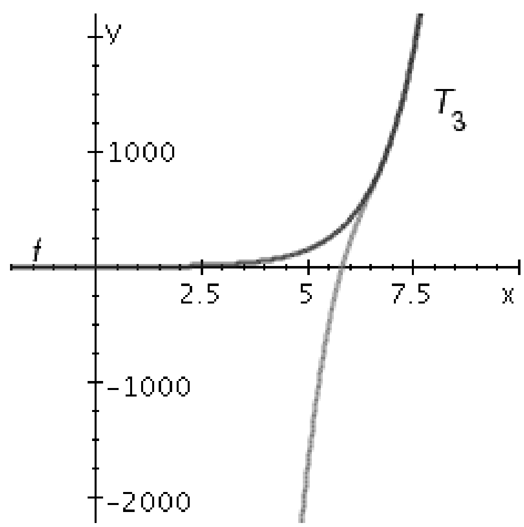
..to be continued

continuation

c. $T_3 = e^7 + e^7(x - 7) + \frac{e^7}{2}(x - 7)^2 + \frac{e^7}{6}(x - 7)^3$



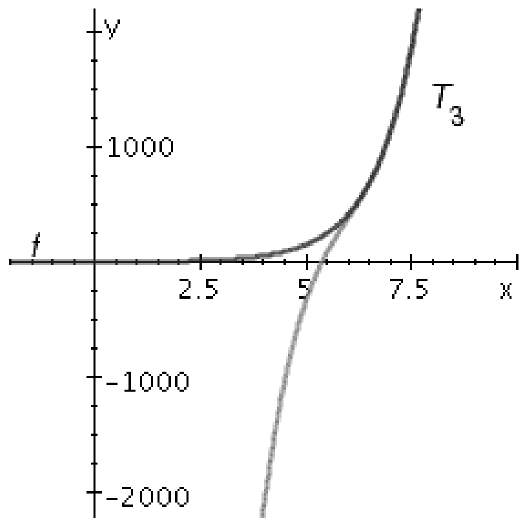
d. $T_3 = e^7 + e^7(x - 7) + \frac{e^7}{2}(x - 7)^2 + \frac{e^7}{3}(x - 7)^3$



..to be continued

continuation

e. $T_3 = e^7 + e^7(x - 7) + \frac{e^7}{2}(x - 7)^2 + \frac{e^7}{3}(x - 7)^3$



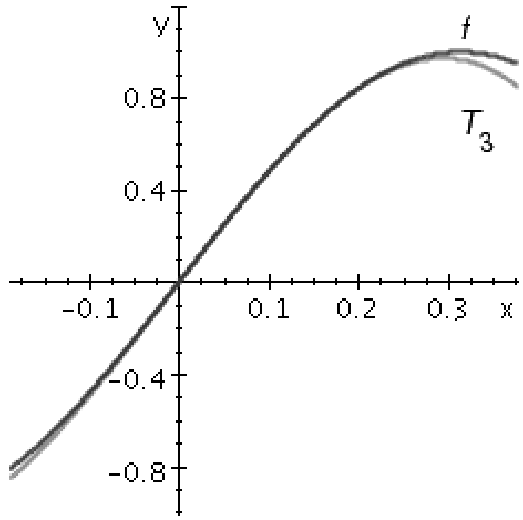
Problem code: stet. 11.12.04m

Name: ___________________ Class:___ Date: _____________

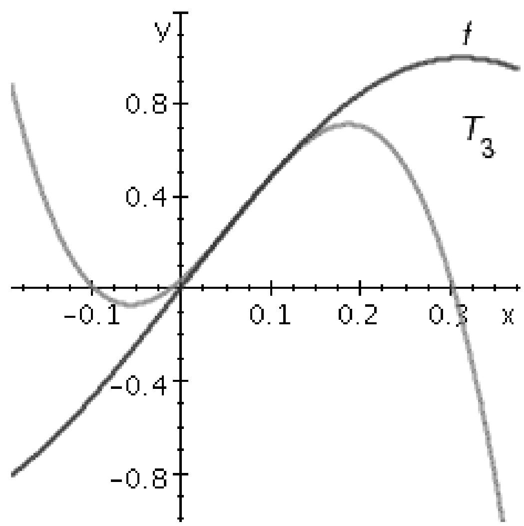
2 Find the Taylor polynomial $T_n(x)$ for the function *f* at the number *a*. Graph *f* and T_n on the same screen.

$$f(x) = \sin 5x\ ,\ a = \frac{\pi}{30}\ ,\ n = 3$$

a. $T_3 = \frac{1}{2} + \frac{5\sqrt{3}}{2}\left(x - \frac{\pi}{30}\right) - \frac{25}{4}\left(x - \frac{\pi}{30}\right)^2 - \frac{125\sqrt{3}}{12}\left(x - \frac{\pi}{30}\right)^3$



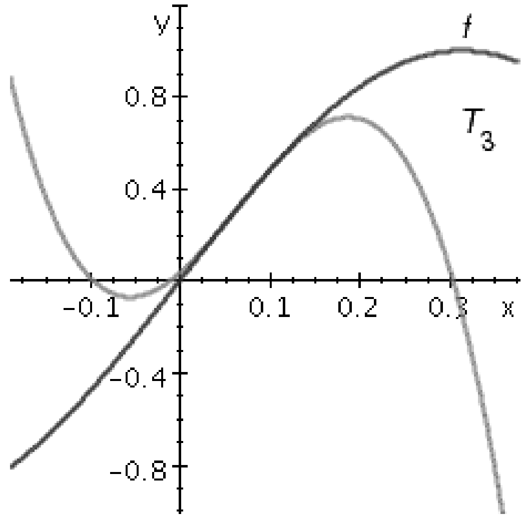
b. $T_3 = \frac{1}{2} + \frac{5\sqrt{3}}{2}\left(x - \frac{\pi}{30}\right) - \frac{25}{2}\left(x - \frac{\pi}{30}\right)^2 - \frac{125\sqrt{3}}{2}\left(x - \frac{\pi}{30}\right)^3$



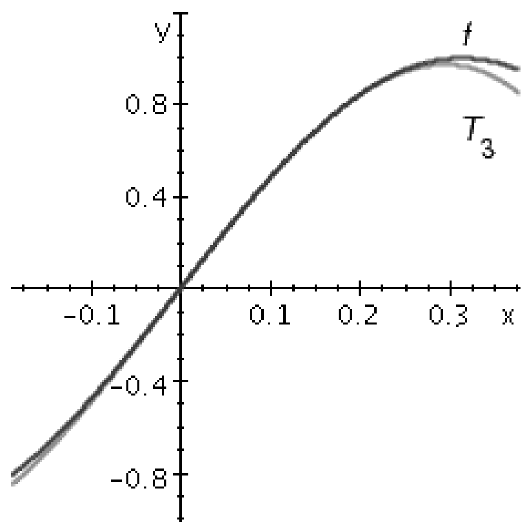
..to be continued

continuation

c. $T_3 = \frac{1}{2} + \frac{5\sqrt{3}}{2}\left(x - \frac{\pi}{30}\right) + \frac{25}{2}\left(x - \frac{\pi}{30}\right)^2 - \frac{125\sqrt{3}}{2}\left(x - \frac{\pi}{30}\right)^3$



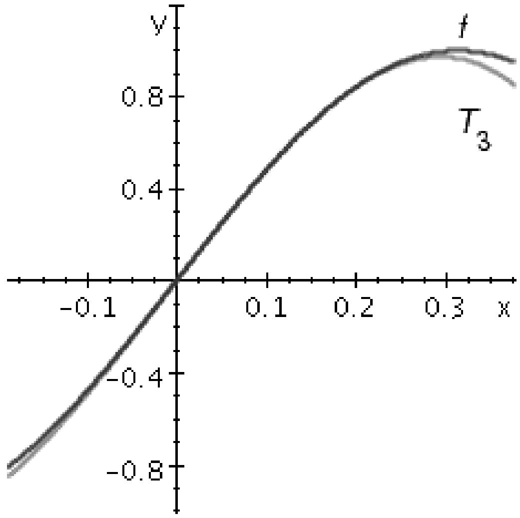
d. $T_3 = \frac{1}{2} + \frac{5\sqrt{3}}{2}\left(x - \frac{\pi}{30}\right) - \frac{25}{2}\left(x - \frac{\pi}{30}\right)^2 - \frac{125\sqrt{3}}{2}\left(x - \frac{\pi}{30}\right)^3$



..to be continued

continuation

e. $T_3 = \frac{1}{2} + \frac{5\sqrt{3}}{2}\left(x - \frac{\pi}{30}\right) + \frac{25}{4}\left(x - \frac{\pi}{30}\right)^2 - \frac{125\sqrt{3}}{12}\left(x - \frac{\pi}{30}\right)^3$



Problem code: stet. 11.12.05m

3 Find the Taylor polynomial $T_n(x)$ for the function f at the number a .

$f(x) = xe^{-4x}, a = 0, n = 3$

Problem code: stet. 11.12.09

4 $f(x) = 3e^{x^2}$

Approximate f by a Taylor polynomial with degree 3 at the number $a = 0$

Use Taylor's Inequality to estimate the accuracy of the approximation $f(x) \approx T_3(x)$ when $0 \le x \le 0.1$.

Please give the answer to five decimal places.

Problem code: stet. 11.12.19

5 Use Taylor's Inequality to determine the number of terms of the Maclaurin series for e^x that should be used to estimate $e^{0.1}$ to within 0.001.

$n =$ _______

Problem code: stet. 11.12.25

6 Use the Alternating Series Estimation Theorem or Taylor's Inequality to estimate the range of values of x for which the given approximation is accurate to within the stated error.

$$\sin x \approx x - \frac{x^3}{6}, \; (|\text{error}| \le 0.1)$$

a. $-0.905 < x < 0.905$
b. $-0.136 < x < 0.136$
c. $-1.644 < x < 1.644$
d. $-0.435 < x < 0.435$
e. $-0.980 < x < 0.980$

Problem code: stet. 11.12.27m

7 Use the Alternating Series Estimation Theorem or Taylor's Inequality to estimate the range of values of x for which the given approximation is accurate to within the stated error.

$$\cos x \approx 1 - \frac{x^2}{2} + \frac{x^4}{24}, \; (|\text{ error}| \le 0.000005)$$

a. $-0.551 < x < 0.551$
b. $-0.966 < x < 0.966$
c. $-0.391 < x < 0.391$
d. $-1.440 < x < 1.440$
e. $-1.581 < x < 1.581$

Problem code: stet. 11.12.28m

ANSWER KEY

Homework 11.12 Math 19B Winter 2007, Bauerle

1. c **2.** a **3.** $T_3 = x - 4x^2 + 8x^3$ **4.** $T_3 = 3 + 3x^2$; $\left| R_3 \right| \le 0.00016$

5. 3 **6.** c **7.** c