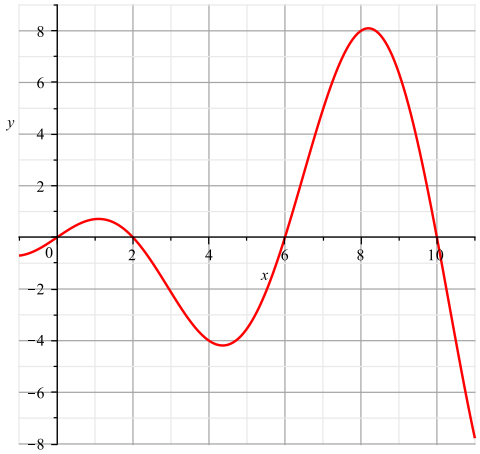
# Some Sample Problems for Exam 3

These are only a few *additional* problems to help you prepare for the exam. You should also be certain that you completely understand the WeBWorK assignments, Problems Sets, Reading Assignments, in-class work, and your class notes.

1. Let $f(x) = e^x$.
   (a) Find the equation of the line tangent to $y = f(x)$ at $x = 0$. Use this to approximate $e$.
   (b) What is the fifth degree Maclaurin polynomial of $f(x)$? Use it to approximate $e$.
   (c) Which approximation do you think will be more accurate? Why?

2. If $F(x) = \int_0^x 2t\cos(t^2)\,dt$, find the equation of the tangent line to $y = F(x)$ at $x = 1$.

3. The graph of $y = f(t)$ is shown below. Let $F(x) = \int_1^x f(t)\,dt$.
   (a) Use a left sum with four subdivisions to approximate $F(9)$.
   (b) Is $F(2)$ positive or negative?
   Is $F(6)$ positive or negative
   Is $F(0)$ positive or negative?
   (c) Where is $F$ increasing? decreasing?
   (d) Identify all local maxima and minima of $F$.
   (e) Where is $F$ concave up? concave down?
   (f) Which of your answers would change if $F(x) = \int_5^x f(t)\,dt$? Why?



**Graph of y= f (t)**

4. This question refers to the function $f$ graphed in #3 above.
   (a) Will $L_{30}$ overestimate or underestimate $\int_5^8 f(t)\,dt$? Why?
   (b) Will $T_{30}$ overestimate or underestimate $\int_7^{10} f(t)\,dt$? Why?
   (c) Give an interval $[a, b]$ where both $T_n$ and $R_n$ will underestimate $\int_a^b f(t)\,dt$. Explain

5. Approximate the integral $\int_0^1 \cos(x^3)\,dx$ using a Maclaurin polynomial.
   *Hint: Remember that you can use the Maclaurin polynomial for* $\cos(x)$ *to find the Maclaurin polynomial for* $\cos(x^3)$

6. What is the difference between a definite integral and an indefinite integral?

7. Why do we use radians to measure angles in calculus rather than degrees?