5. Find all critical points of the function

$$A(X) = \int_0^X \cos(x^2)\,dx$$

on the interval $0 \le X \le 4$. Indicate which critical points are local maxima and which are local minima. (Critical points and local maxima and minima are discussed on pages 303–309.)

[Answer: There are five critical points in the interval $[0, 4]$. The first is a local maximum at $\sqrt{\pi/2}$.]

6. Find all critical points of the function

$$A(X) = \int_0^X \sin(x^2)\,dx$$

on the interval $0 \le X \le 4$. Indicate which critical points are local maxima and which are local minima.

7. Find *all* critical points of the function

$$A(X) = \int_0^X x^2 - 4x^3\,dx.$$

Indicate which critical points are local maxima and which are local minima.

8. Express the solution to each of the following initial value problems as an accumulation function (that is, as an integral with a variable upper limit of integration).

a) $y' = \cos(x^2), \quad y(\sqrt{\pi}) = 0$

b) $y' = \sin(x^2), \quad y(0) = 0$

c) $y' = \sin(x^2), \quad y(0) = 5$

d) $y' = e^{-x^2}, \quad y(0) = 0$

9. Sketch the graphs of the following accumulation functions over the indicated intervals.

a) $\displaystyle\int_0^X \sin(x^2)\,dx, \quad 0 \le X \le 4$

b) $\displaystyle\int_0^X \frac{\sin(x)}{x}\,dx, \quad 0 \le X \le 4$