Section 1 Part B (calculator):

29. If $f'(x) = \int_0^x - \cos t\, dt$ on $[0, 2\pi]$,
then f has a local maximum at $x =$
   a. 0
   b. $\dfrac{\pi}{2}$
   c. π
   d. $\dfrac{3\pi}{2}$
   e. 2π
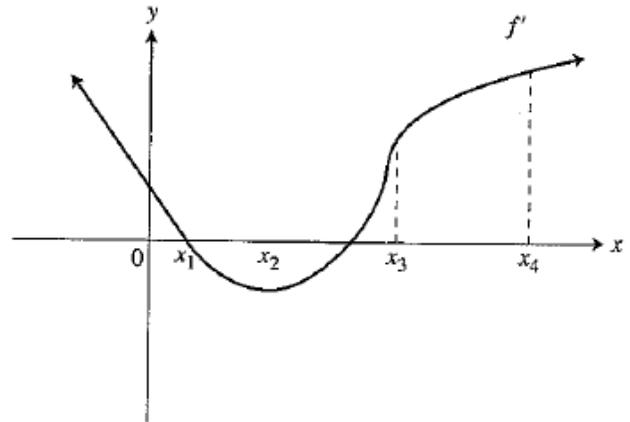
30. The equation of the normal line to the

graph $y = e^{2x}$ at the point $\dfrac{dy}{dx} = 2$ is

   a. $y = -\dfrac{1}{2}x - 1$

   b. $y = -\dfrac{1}{2}x + 1$

   c. $y = 2x + 1$

   d. $y = -\dfrac{1}{2}\left(x - \dfrac{\ln 2}{2}\right) + 2$

   e. $y = 2\left(x - \dfrac{\ln 2}{2}\right) + 2$

31. The graph of f', the derivative of f, is shown in Figure 1T-8. At which value of x does the graph of f have a point of inflection?
   a. 0
   b. x_1
   c. x_2
   d. x_3
   e. x_4

Figure 1T-8

32. The temperature of a metal is dropping at the rate of $g(t) = 10e^{-0.1t}$ for $0 \le t \le 10$ where g is measured in degrees in Fahrenheit and t in minutes. If the metal is initially $100°F$, what is the temperature to the nearest degree Fahrenheit after 6 minutes?
   a. 37
   b. 45
   c. 55
   d. 63
   e. 82

33. What is the approximate volume of the solid obtained by revolving about the x-axis the region in the first quadrant enclosed by the curves $y = x^3$ and $y = \sin x$?
   a. 0.061π
   b. 0.139π
   c. 0.215π
   d. 0.225π
   e. 0.278π

34. Let f be a differentiable function on (a, b) . If f has a point of inflection on (a, b), which of the following could be the graph of f'' on (a, b)? See Figure 1T-9.

a. A
b. B
c. C
d. D
e. None
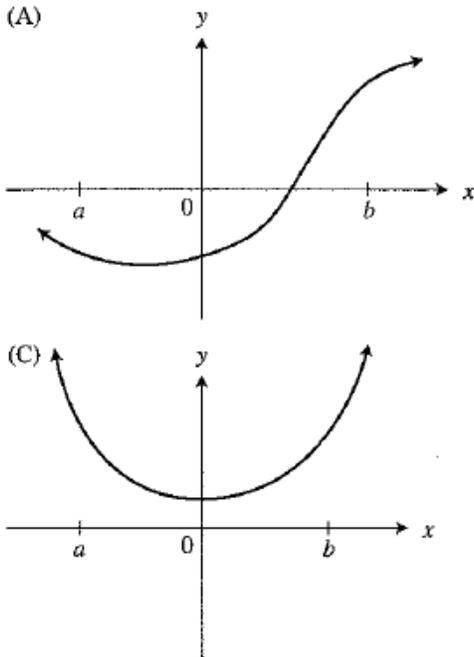
(A)

(B)

(C)

(D)

Figure 1T-9

35. The base of a solid is a region bounded by the lines $y = x$, $y = -x$ and $x = 4$ as shown in Figure 1T-10. What is the volume of the solid if the cross sections perpendicular to the x-axis are equilateral triangles?

Figure 1T-10

a. $\dfrac{16\sqrt{3}}{3}$

b. $\dfrac{32\sqrt{3}}{3}$

c. $\dfrac{64\sqrt{3}}{3}$

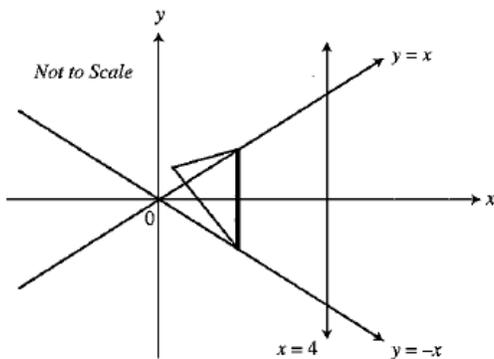d. $\dfrac{256\sqrt{3}}{3}$

e. $\dfrac{3072\sqrt{3}}{3}$

36. Let f be a continuous function on $[0,6]$ and have selected values as shown below.

x	0	2	4	6
$f(x)$	0	1	2.25	6.25

If you use the subintervals $[0,2]$, $[2,4]$, and $[4,6]$, what is the trapezoidal approximation of $\int_0^6 f(x)dx$?

a. **9.5**   b. **12.75**
c. **19**   d. **25.5**
e. **38.25**

37. The amount of a certain bacteria y in a petri dish grows according to the equation $\dfrac{dy}{dt} = ky$, where k is a constant and t is measured in hours. If the amount of bacterial triples in 10 hours then $k \approx$

a. -1.204 b. -0.110
c. 0.110 d. 1.204
e. 0.3

38. The volume of the solid generated by revolving about the y-axis the region bounded by the graphs of $y = \sqrt{x}$ and $y = x$ is

a. $\dfrac{2\pi}{15}$ b. $\dfrac{\pi}{6}$

c. $\dfrac{2\pi}{3}$ d. $\dfrac{16\pi}{15}$

e. $\dfrac{56\pi}{15}$

39. How many points of inflection does the graph of $y = \dfrac{\sin x}{x}$ have on the interval $(-\pi, \pi)$?

a. 0   b. 1   c. 2   d. 3   e. 4

40. Given $f(x) = x^2 e^x$, what is the approximate value of $f(1.1)$, if you use a tangent line to the graph of f at $x = 1$.

a. **3.534**   b. **3.635**
c. **7.055**   d. **1.369**
e. **10.244**

41. The area under the curve $y = \sin x$ from $x = b$ to $x = \pi$ is 0.2. If $0 \le b < \pi$, then $b =$

a. -0.927 b. -0.201
c. 0.644 d. 1.369
e. 2.498

42. At what value(s) of x do the graphs $y = x^2$ and $y = \sqrt{x}$ have perpendicular tangent lines?

a. -1 b. 0 c. $\dfrac{1}{4}$ d. 1 e. None

43. What is the approximate slope of the tangent to the curve $x^3 + y^3 = xy$ at $x = 1$?

a. -2.420 b. -1.325
c. -1.014 d. -0.698
e. 0.267

44. The graph of f is shown in Figure 1T-11, and $g(x) = \int_a^x f(t)dt$. Which of the following is a possible graph of g? See Figure 1T-12.
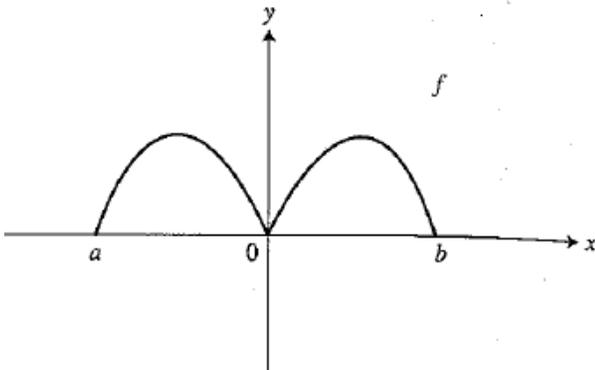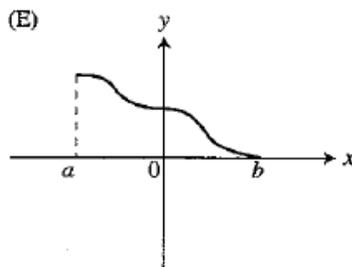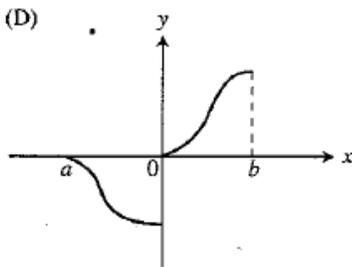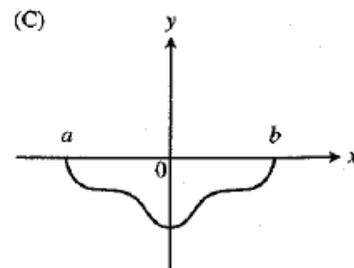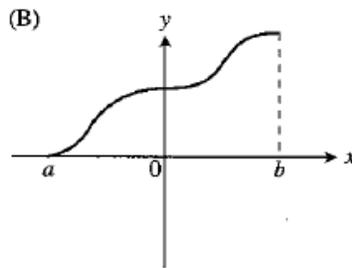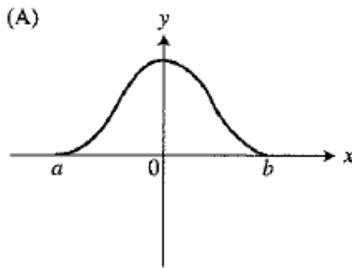

Figure 1T-11

Figure 1T-12

45. If $g(x) = |xe^x|$, which of the following statements about g are true?

I. g has a relative minimum at $x = 0$.

II. g changes concavity at $x = 0$.

III. g is differentiable at $x = 0$.

   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I and III only