32. The equation of the horizontal asymptote for the graph of $y = \dfrac{2 - e^{\frac{1}{x}}}{2 + e^{\frac{1}{x}}}$ is

(A) $y = -1$ (B) $y = -\dfrac{1}{2}$ (C) $y = \dfrac{1}{3}$ (D) $y = \dfrac{1}{2}$ (E) $y = 1$

33. Let f be a function which is continuous on $[2, 10]$ and whose derivative is given by $f'(x) = \dfrac{\cos x}{\ln(x+1)}$. Which of the following are true about $f(x)$ on the interval $[2, 10]$?

I. $f(x)$ is monotonic.

II. $f(x)$ has a relative minimum.

III. $f(x)$ has three points of inflection.

(A) I only (B) II only (C) III only (D) II and III only (E) I, II, and III

34. The base of a solid is the region enclosed by the graph of $y = 3(x-2)^2$ and the coordinate axes. If every cross section perpendicular to the x-axis is a square, then the volume of the solid is

(A) 8.0 (B) 19.2 (C) 24.0 (D) 25.6 (E) 57.6

35. When $x = \dfrac{\pi}{4}$, the rate at which $\sin^2 x$ is increasing is k times the rate at which x is increasing. What is the value of k?

(A) $\sqrt{2}$ (B) $\dfrac{\sqrt{2}}{2}$ (C) 1 (D) $\dfrac{1}{2}$ (E) -1

36. The expression $\dfrac{1}{4}\left(\sqrt{1} + 2\sqrt{5/4} + 2\sqrt{2} + 2\sqrt{13/4} + \sqrt{5}\right)$ is the trapezoidal approximation for which of the following definite integrals?

(A) $\displaystyle\int_1^3 \sqrt{x}\,dx$ (B) $\displaystyle\int_1^5 \sqrt{x}\,dx$ (C) $\displaystyle\int_0^4 \sqrt{x^2+1}\,dx$

(D) $\displaystyle\int_0^2 \sqrt{x^2+1}\,dx$ (E) $\displaystyle\int_{-1}^2 \sqrt{x^2+1}\,dx$

37. The average value of the function $f(x) = e^{-x}\sin x$ on the closed interval $[1, \pi]$ is

(A) 0.129 (B) 0.145 (C) 0.155 (D) 0.276 (E) 0.310

38. The position of an object attached to a spring is given by $y(t) = \frac{1}{3}\sin(4t) - \frac{1}{8}\cos(4t)$ where t is time in seconds. How many times does the acceleration of the object change from negative to positive in the first 5 seconds?

(A) Three (B) Four (C) Five (D) Six (E) Seven

39. The present price of a new car is \$14,500. The price of a new car is changing at a rate of $120 + 180\sqrt{t}$ dollars per year. How much will a new car cost 5 years from now?

(A) \$15,020 (B) \$15,300 (C) \$16,440 (D) \$18,120 (E) \$22,600

40. The amount of a radioactive substance decays according to the equation $\frac{dy}{dt} = ky$ where k is a constant and time, t, is measured in days. If half of the amount present will decay in 20 days, what is the value of k?

(A) −13.066 (B) −6.021 (C) −0.693 (D) −0.035 (E) −0.015

41. Let f be the function given by $f(x) = x^2 \ln x$. For what value of x is the slope of the line tangent to the graph of f at $(x, f(x))$ equal to 2?

(A) 1.305 (B) 1.548 (C) 2.000 (D) 2.548 (E) 4.773

42. The mass $m(t)$, in grams, of a tumor t weeks after it begins growing is given by $m(t) = \frac{te^t}{80}$. What is the average rate of change, in grams per week, during the fifth week of growth?

(A) 2.730 (B) 3.412 (C) 6.189 (D) 6.546 (E) 11.131

43. Let $f(x)$ be a differentiable function defined for all real numbers. The table below gives the value of $f(x)$ and its derivative $f'(x)$ for several values of x.

x	-3	-2	-1	0	1	2	3
$f(x)$	8	5	0	1	0	5	8
$f'(x)$	-6	-4	-2	0	2	4	6

Which of the following statements are true about $f(x)$?

I. At $x = 2$, the function is increasing.

II. There is a relative minimum in the interval $-1 \le x \le 1$, but not necessarily at $x = 0$.

III. There is a relative maximum in the interval $-1 \le x \le 1$.

(A) I only (B) II only (C) III only (D) I and II only (E) I, II, and III

44. A particle moves along the x-axis so that its position at any time $t > 0$ is given by $x(t) = t^3 + 22t + 3 - 6\cos(\pi t)$. For what value of t is the velocity negative?

(A) $t = \frac{1}{2}$ (B) $t = 1$ (C) $t = \frac{3}{2}$ (D) $t = 2$ (E) The velocity is never negative.

45. The closed interval $[0, \pi]$ is partitioned into n equal subdivisions each of length $\Delta x = \frac{\pi}{n}$ by the numbers $x_0, x_1, x_2 \ldots, x_{n-1}, x_n$, with $0 = x_0 < x_1 < x_2 < \ldots < x_{n-1} < x_n = \pi$.

The $\lim_{n\to\infty} \sum_{i=1}^{n} x_i \cos(x_i)\Delta x$ is

(A) -2 (B) -1 (C) 1 (D) 2 (E) π