# AP Calculus Multiple Choice Questions - Chapter 6

| | |
|---|---|
| | **6.1a** |

**1** A truck moves with positive velocity v(t) from time t = 3 to time t = 15. The area under the graph of y = v(t) between 3 and 15 gives

**a** The velocity of the truck at t = 15 sec
**b** The acceleration of the truck at t = 15 sec
**c** The position of the truck at t = 15 sec
**d** The distance traveled by the truck from t = 3 sec to t = 15 sec
**e** The average position of the truck in the interval from t = 3 sec to t = 15 sec

| | |
|---|---|
| | **6.1a** |

**2** A particle starts at x = 0 and moves along the x-axis with velocity v(t) = 5 sec for time t > 0. Where is the particle at t = 4?

**a** x = 5
**b** x = 20
**c** x = 10
**d** x = 15

| | |
|---|---|
| | **6.1a** |

**3** A beach is eroding at a rate of 3 cubic yards per day. How much of the beach will be lost over a year? (365 days)

**a** 1095 cubic yards
**b** 1352 cubic yards
**c** 945 cubic yards
**d** 1855 cubic yards

# AP Calculus Multiple Choice Questions - Chapter 6

**1** If an MRAM sum with four rectangles of equal width is used to approximate the area enclosed between the x-axis and the graph of $y = 4x - x^2$, the approximation is

| | 6.1b |
|---|---|

**a** 10
**b** 10.5
**c** 10.67
**d** 10.75
**e** 11

**2** If f is a positive, continuous function on an interval [a, b], which of the following rectangular approximation methods has a limit equal to the actual area under the curve from a to b as the number of rectangles approaches infinity?

| | 6.1b |
|---|---|

I. LRAM
II. RRAM
III. MRAM

**a** I and II only
**b** III only
**c** I and III only
**d** I, II, and III
**e** None of these

**3** Use RRAM with n = 100 to estimate the area of the region enclosed between the graph of f and the x-axis for $a < x < b$ $f(x) = x^2 - x + 3$ $a = 0$ $b = 3$

| | 6.1b |
|---|---|

**a** 12.11
**b** 9.03
**c** 13.59
**d** 15.58

# AP Calculus Multiple Choice Questions - Chapter 6

**1** Express the limit as a definite integral $\lim_{n->\infty} \sum_{k=1}^{n} c_k^2 \Delta x$ [0, 2]

| | 6.2a |
|---|---|

**a** $\int_0^2 x^2 dx$

**b** $-\int_0^2 x^2 dx$

**c** $\int_2^0 x^2 dx$

**d** $-\int_2^0 x^2 dx$

**2** Express the limit as a definite integral $\lim_{n->\infty} \sum_{k=1}^{n} (c_k^2 - 3c_k)\Delta x$ [-7, 5]

| | 6.2a |
|---|---|

**a** $\int_5^{-7} (x^2 - 3)\,dx$

**b** $\int_{-7}^{5} (x^2 - 3)\,dx$

**c** $\int_5^{-7} (x^2 - 3x)\,dx$

**d** $\int_{-7}^{5} (x^2 - 3x)dx$

**3** Express the limit as a definite integral $\lim_{n->\infty} \sum_{k=1}^{n} \frac{1}{c_k} \Delta x$ [1, 4]

| | 6.2a |
|---|---|

**a** $\int_1^4 xdx$

**b** $\int_1^4 \frac{1}{x} dx$

**c** $\int_4^1 xdx$

**d** $\int_4^1 \frac{1}{x} dx$

# AP Calculus Multiple Choice Questions - Chapter 6

**1** If $\int_2^5 f(x)dx = 18$ then $\int_2^5 (f(x)+4)dx$ =

| | 6.2b |
|---|---|

**a** 20
**b** 22
**c** 23
**d** 25
**e** 30

**2** Which of the following quantities would not be represented by the definite integral $\int_0^8 70dt$

| | 6.2b |
|---|---|

**a** The distance traveled by a train moving at 70 mph for 8 minutes
**b** The volume of ice cream produced by a machine making 70 gallons per hour for 8 hours
**c** The length of a track left by a snail traveling at 70 cm per hour for 8 hours
**d** The total sales of a company selling $70 of merchandise per hour for 8 hours
**e** The amount the tide has risen 8 minutes after low tide if it rises at a rate of 70 mm per minute during that period

**3** Evaluate the integral: $\int_{-2}^1 5dx$

| | 6.2b |
|---|---|

**a** 5
**b** 15
**c** 10
**d** 20

# AP Calculus Multiple Choice Questions - Chapter 6

**1** Use the graph of the integrand and areas to evaluate the integral $\int_{-2}^{4} (\frac{x}{2} + 3)dx$

| | |
|---|---|
| | **6.2c** |

**a** 29 **b** 15
**c** 21 **d** 8

**2** Use the graph of the integrand and areas to evaluate the integral $\int_{1/2}^{3/2} (-2x + 4)dx$

| | |
|---|---|
| | **6.2c** |

**a** 1 **b** 2
**c** 3 **d** 4

**3** Use the graph of the integrand and areas to evaluate the integral $\int_{-4}^{0} \sqrt{16 - x^2}\, dx$

| | |
|---|---|
| | **6.2c** |

**a** 2π **b** 4π
**c** 6π **d** 8π

# AP Calculus Multiple Choice Questions - Chapter 6

**1** Evaluate using a calculator: $\int_{-4}^{4}(4-|x|)dx$

| | |
|---|---|
| | **6.2d** |

**a** 0
**b** 4
**c** 8
**d** 16
**e** 32

**2** Evaluate using a calculator: $\int_{0}^{5}\frac{x}{x^2+4}dx$

| | |
|---|---|
| | **6.2d** |

**a** 1.9885
**b** 0.9905
**c** 0.0028
**d** 1.3422

**3** Evaluate using a calculator: $3+\int_{0}^{\pi/3}\tan x\,dx$

| | |
|---|---|
| | **6.2d** |

**a** 4.39
**b** 3.33
**c** 5.22
**d** 5.89

# AP Calculus Multiple Choice Questions - Chapter 6

**1** Evaluate: $\int_0^1 e^x dx$

| | 6.3a |
|---|---|

**a** 1
**b** e - 1
**c** e + 1
**d** e

**2** Evaluate: $\int_1^4 2x dx$

| | 6.3a |
|---|---|

**a** 15
**b** 9
**c** 12
**d** 6

**3** Evaluate: $\int_3^7 (1/x) dx$

| | 6.3a |
|---|---|

**a** e - 1
**b** e
**c** 2e
**d** 1

# AP Calculus Multiple Choice Questions - Chapter 6

**1** What is the average value of the cosine function on the interval [1, 5]?

| | 6.3b |
|---|---|

**a** -0.990 **b** -0.450
**c** -0.128 **d** 0.412
**e** 0.998

**2** If the average value of the function f on the interval [a, b] is 10, then the integral of f(x) from a to b is

| | 6.3b |
|---|---|

**a** 10 / (b - a) **b** (f(a) + f(b)) / 10
**c** 10b - 10a **d** (b - a) / 10
**e** (f(b) + f(a)) / 20

**3** Find the average value of the sin function on the interval [0, 2π]

| | 6.3b |
|---|---|

**a** 0 **b** -2
**c** -1 **d** 2
**e** 1

# AP Calculus Multiple Choice Questions - Chapter 6

**1** Find dy/dx for the following function $y = \int_0^x \sin^2 t\,dt$

| | 6.4a |
|---|---|

**a** sin (t)
**b** $\sin^2(t)$
**c** sin (x)
**d** $\sin^2(x)$

**2** Find dy/dx for the following function $y = \int_0^x (t^3 - t)^5\,dt$

| | 6.4a |
|---|---|

**a** $(t^3 - t)^5$
**b** $(t^3 + t)^5$
**c** $(x^3 - x)^5$
**d** $(x^3 + x)^5$

**3** Find dy/dx for the following function $y = \int_6^{x^2} \cot(3t)\,dt$

| | 6.4a |
|---|---|

**a** $2x \cot(3x^2)$
**b** $\cot(3x^2)$
**c** $2t \cot(3t^2)$
**d** $6 \cot(3x^2)$

# AP Calculus Multiple Choice Questions - Chapter 6

**1** A city is built around a circular lake that has a radius of 1 mile. The population density of the city is f(r) people per square mile, where r is the distance from the center of the lake, in miles.

Which of the following expressions gives the number of people who live within 1 mile of the lake?

| | | | |
|---|---|---|---|
| | | | **6.4b** |

**a** $2\pi\int_0^1 rf(r)dr$

**b** $2\pi\int_0^1 r(1+f(r))dr$

**c** $2\pi\int_0^2 r(1+f(r))dr$

**d** $2\pi\int_1^2 rf(r)dr$

**e** $2\pi\int_1^2 r(1+f(r))dr$

**2** Construct a function of the form $y=\int_a^x f(t)dt+C$ that satisfies the given conditions

| | | | |
|---|---|---|---|
| | | | **6.4b** |

$dy/dx = \sin^3 x$ $y = 0$ when $x = 5$

**a** $y=\int_x^5 \sin^3 t\,dt$

**b** $y=\int_5^x \sin^3 t\,dt$

**c** $y=-\int_x^5 \sin^3 t\,dt$

**d** $y=-\int_5^x \sin^3 t\,dt$

**3** Construct a function of the form $y=\int_a^x f(t)dt+C$ that satisfies the given conditions

| | | | |
|---|---|---|---|
| | | | **6.4b** |

$dy/dx = e^x \tan x$ $y = 0$ when $x = 8$

**a** $y=\int_x^8 e^t \tan t\,dt$

**b** $y=\int_8^x e^t \tan t\,dt$

**c** $y=-\int_x^8 e^t \tan t\,dt$

**d** $y=-\int_8^x e^t \tan t\,dt$

# AP Calculus Multiple Choice Questions - Chapter 6

**1** If g(x) = $x^2$ - 3x + 4 and f(x) = g'(x), then $\int_1^3 f(x)dx$ =

| | 6.4c |
|---|---|

**a** -(14/3)
**b** -2
**c** 2
**d** 4
**e** 14/3

**2** If y = $5+\int_2^{2x} e^{-t^2}dt$ , which of the following is true?

| | 6.4c |
|---|---|

**a** $\frac{dy}{dx}e^{-x^2}$ and y(0) = 5

**b** $\frac{dy}{dx}e^{-x^2}$ and y(1) = 5

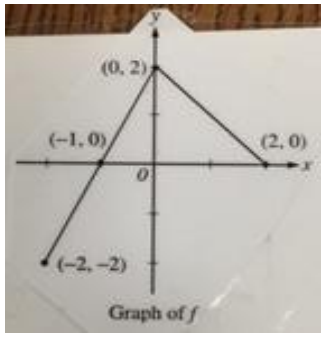
**c** $\frac{dy}{dx}=e^{-4x^2}$ and y(1) = 5

**d** $\frac{dy}{dx}=2e^{-4x^2}$ and y(0) = 5

**e** $\frac{dy}{dx}=2e^{-4x^2}$ y(1) = 5

| | 6.4c |
|---|---|

**3**




The graph of the function f shown above consists of two line segments. If g is the function defined by $g(x) = \int_0^x f(t)dt$, then g(-1) =

**a** -2
**b** -1
**c** 0
**d** 1
**e** 2

| | 6.4c |
|---|---|

**4** If y = $3 + \int_2^{2x} e^{-2t}\,dt$, which of the following is true?

**a** $\frac{dy}{dx}e^{-x^2}$ and y(1) = 5

**b** $\frac{dy}{dx}e^{-x^2}$ and y(1) = 5

**c** $\frac{dy}{dx} = e^{-4x^2}$ and y(1) = 3

**d** $\frac{dy}{dx} = -2e^{-2x}$ and y(0) = 3

**e** $\frac{dy}{dx} = -2e^{-2x}$ and y(1) = 3

# AP Calculus Multiple Choice Questions - Chapter 6

| x | 0 | 2 | 4 | 6 |
|---|---|---|---|---|
| f(x) | 4 | k | 8 | 12 |

| | 6.5 |
|---|---|

**1** The function f is continuous on the closed interval [0,6] and has the values given in the table above. The trapezoidal approximation for $\int_0^6 f(x)dx$ found with 3 subintervals of equal length is 52. What is the value of k?

**a** 2
**b** 6
**c** 7
**d** 10
**e** 14

**2** If three equal subdivisions of [-2, 4] are used, what is the trapezoidal approximation of $\int_{-2}^{4} \frac{e^x}{2}dx$

| | 6.5 |
|---|---|

**a** $e^4 + e^2 + e^0 + e^{-2}$
**b** $e^4 + 2e^2 + 2e^{0+} e^{-2}$
**c** $(1/2)(e^4 + e^2 + e^0 + e^{-2})$
**d** $(1/2)\ (e^4 + 2e^2 + 2e^0 + e^{-2})$
**e** $(1/4)\ (e^4 + 2e^2 + 2e^0 + e^{-2})$

**3** The trapezoidal approximation of $\int_0^{\pi} \sin x\,dx$ using 4 equal subdivisions of the interval of integration is

| | 6.5 |
|---|---|

**a** π/2
**b** π
**c** π/4(1 + sqrt(2))
**d** π/2(1 + sqrt(2))
**e** π/4(2 + sqrt(2))