

AP Calculus Practice Exam AB Version - Section I - Part A

Calculators ARE NOT Permitted On This Portion Of The Exam

28 Questions - 55 Minutes

1) Give $f(g(1))$, given that

$$\left[f(x) = 2x + 2, g(x) = -\frac{x}{2 + x^2} \right]$$

- a) $\frac{-8}{9}$ b) $\frac{7}{3}$ c) 2 d) $\frac{4}{3}$ e) $\frac{-2}{9}$

2) Find the slope of the tangent line to the graph of f at $x = 4$, given that

$$f(x) = -x^2 + 4\sqrt{x}$$

- a) -8 b) -10 c) -9 d) -5 e) -7

3) Determine

$$\lim_{x \rightarrow \infty} \left(\frac{-2x^3 + x}{-4x^5 + 2x^2 + 2} \right)$$

- a) ∞ b) 0 c) $\frac{1}{2}$ d) $\frac{3}{10}$ e) 1

4) Let $f(x) = x^3$

A region is bounded between the graphs of $y = -1$ and $y = f(x)$ for x between -1 and 0 , and between the graphs of $y = 1$ and $y = f(x)$ for x between 0 and 1 . Give an integral that corresponds to the area of this region.

- a) $\int_{-1}^1 (1 - x^3) \, dx$ b) $\int_0^1 2(1 - x^3) \, dx$ c) $\int_0^1 2(1 + x^3) \, dx$ d) $\int_{-1}^1 (1 + x^3) \, dx$ e) $\int_0^1 (1 - x^3 - 1) \, dx$

5) Given that

$$5x^3 - 4xy - 2y^2 = 1$$

Determine the change in y with respect to x .

- a) $-\frac{15x^2 - 4}{-4 - 4y}$ b) $-\frac{15x^2 - 4y}{-4 - 4y}$ c) $-\frac{15x^2 - 4}{-4x - 4y}$ d) $-\frac{10x - 4y}{-4x - 2}$ e) $-\frac{15x^2 - 4y}{-4x - 4y}$

6) Compute the derivative of

$$-4 \sec(x) + 2 \csc(x)$$

- a) $-4 \sec(x) \tan(x) - 2 \csc(x) \cot(x)$ b) $-4 \csc(x) - 2 \sec(x)$ c) $-4 (\sec(x))^2 - 2 (\csc(x))^2$
 d) $-4 \sec(x) \tan(x) + 2 \csc(x) \cot(x)$ e) $-4 (\tan(x))^2 - 2 (\cot(x))^2$

7) Compute

$$\int_0^{\frac{1}{2}} \frac{4}{1+4t^2} dt$$

- a) $-\pi$ b) $\frac{3}{2}\pi$ c) $\frac{1}{2}\pi$ d) π e) 0

8) Determine

$$\frac{d}{dx} \left(\frac{4x^4 - 2x}{4x^4 + 2x} \right)$$

- a) $\frac{24x^2 - 1}{(4x^3 + 2)^2}$ b) $\frac{48x^2 - 1}{(4x^3 + 2)^2}$ c) $\frac{12x^2}{(2x^3 + 1)^2}$ d) $\frac{24x^2}{(4x^3 + 2)^2}$ e) $\frac{6x^2}{(4x^3 + 2)^2}$

9) Give the equation of the normal line to the graph of $y = 2x\sqrt{x^2 + 8} + 2$ at the point $(0, 2)$.

- a) $x - 4\sqrt{2}y = -8\sqrt{2}$ b) $x + 4\sqrt{2}y = 8\sqrt{2}$ c) $4\sqrt{2}x + y = 2$ d) $-4\sqrt{2}x + y = 2$ e) $x + 4\sqrt{2}y = 2$

10) Determine the concavity of the graph of $f(x) = 3 \sin(x) + 4 (\cos(x))^2$ at $x = \pi$.

- a) 8 b) -10 c) 4 d) -8 e) -6

11) Compute

$$\int 4x^2 \sqrt{x^3 + 4} dx$$

- a) $\frac{8}{3} (x^3 + 4)^{(3/2)} + C$ b) $\frac{16}{9} (x^3 + 4)^{(3/2)} + C$ c) $\frac{8}{9} (x^3 + 4)^{(3/2)} + C$ d) $\frac{4}{3} \frac{1}{\sqrt{x^3 + 4}} + C$ e) $\frac{8}{3} \frac{1}{\sqrt{x^3 + 4}} + C$

12) Give the value of x where the function $f(x) = x^3 - 9x^2 + 24x + 4$ has a local maximum.

- a) 4 b) -2 c) 2 d) -4 e) 3

13) The slope of the tangent line to the graph of $4x^2 + cx - 2e^y = -2$ at $x = 0$ is 4. Give the value of c .

- a) -2 b) 4 c) 8 d) -4 e) -8

14) Compute

$$\int (5^x + 2e^{(5 \ln(x))}) dx$$

- a) $\frac{5^x}{\ln(5)} + \frac{2}{5} e^{(5 \ln(x))} + C$ b) $5^x \ln(5) + \frac{2}{5} e^{(5 \ln(x))} + C$ c) $5^x \ln(5) + \frac{2}{5} \frac{e^{(5 \ln(x))}}{x} + C$
 d) $\frac{5^x}{\ln(5)} + \frac{2}{5} x^5 + C$ e) $\frac{5^x}{\ln(5)} + \frac{1}{3} x^6 + C$

15) What is the average value of the function $g(x) = (2x + 3)^2$ on the interval from $x = -3$ to $x = -1$?

- a) $\frac{7}{3}$ b) -4 c) 5 d) $\frac{14}{3}$ e) 3

16) Compute $\lim_{t \rightarrow 0} \left(\frac{\tan\left(\frac{1}{4}\pi + t\right) - \tan\left(\frac{1}{4}\pi\right)}{t} \right)$

- a) 1 b) $\frac{1}{4}\pi$ c) π d) 2 e) -1

17) Find the instantaneous rate of change of $f(t) = (2t^3 - 3t + 4)\sqrt{t^2 + 3t + 4}$ at $t = 0$.

- a) -3 b) $\frac{-3}{4}$ c) 0 d) -4 e) $\frac{-5}{4}$

18) Compute

$$\frac{d}{dx} 2^{\cos(x)}$$

- a) $\sin(x) 2^{\cos(x)} \ln(2)$ b) $-\sin(x) 2^{\cos(x)} \ln(2)$ c) $-\sin(x) 2^{\cos(x)}$ d) $-\frac{\sin(x) 2^{\cos(x)}}{\ln(2)}$ e) $\frac{\sin(x) 2^{\cos(x)}}{\ln(2)}$

19) A solid is generated by rotating the region enclosed by the graph of

$$y = \sqrt{x}$$

the lines $x = 1$, $x = 2$, and $y = 1$, about the x -axis. Which of the following integrals gives the volume of the solid?

- a) $\int_1^2 \pi (x - 1) dx$ b) $\int_1^2 \pi (x - 1)^2 dx$ c) $\int_1^2 \pi (\sqrt{x} - 1)^2 dx$ d) $\int_1^2 \pi (2 - x)^2 dx$ e) $\int_1^2 \pi (2 - \sqrt{x})^2 dx$

20) Compute

$$\lim_{x \rightarrow 0} \left(-\frac{4x}{\sin(2x)} + \frac{x}{\cos(2x)} \right)$$

- a) ∞ b) 0 c) $\frac{-5}{2}$ d) -2 e) *undefined*

21) Given $y > 0$ and

$$\frac{dy}{dx} = \frac{3x^2 + 4x}{y}$$

If the point $(1, \sqrt{10})$ is on the graph relating x and y , then what is y when $x = 0$?

- a) 3 b) 2 c) 1 d) 6 e) 10

22) Determine

$$\int_1^2 \frac{1}{\sqrt{4-t^2}} dt$$

- a) $\frac{1}{2}\pi$ b) $\frac{1}{3}\pi$ c) π d) $\frac{1}{6}\pi$ e) $\frac{1}{4}\pi$

23) Determine

$$\int e^{(2x)} \sqrt{e^x + 1} \, dx$$

- a) $\frac{2}{5} (e^x + 1)^{(5/2)} - \frac{2}{3} (e^x + 1)^{(3/2)} + C$ b) $e^{(2x)} (e^x + 1)^{(3/2)} + C$ c) $\frac{2}{5} e^{(\frac{5}{2}x)} - 5e^{(\frac{3}{2}x)} + C$
 d) $\frac{2}{5} (e^x + 1)^{(5/2)} - 3 (e^x + 1)^{(3/2)} + C$ e) $\frac{2}{5} (e^x + 1)^{(5/2)} + 3 (e^x + 1)^{(3/2)} + C$

24) A particle's acceleration for $t \geq 0$ is given by $a(t) = 12t + 4$

The particle's initial position is 2 and its velocity at $t = 1$ is 5. What is the position of the particle at $t = 2$?

- a) 10 b) 12 c) 16 d) 4 e) 20

25) Determine

$$\int_0^{\frac{1}{2}\pi} \sin(3x) \, dx + \int_0^{\frac{1}{6}\pi} \cos(3x) \, dx$$

- a) -1 b) 1 c) 0 d) 2/3 e) -2/3

26) Determine the derivative of $f(x) = (\cos(2x - 4))^3$ at $x = \pi/b$.

- a) $-6 (\cos(\pi - 4))^2$ b) $-6 \cos(\pi - 4)^2 \sin(\pi - 4)$ c) $-6 (\cos(\pi - 4))^2 \sin(\pi - 4)$
 d) $18 (\cos(\pi - 4))^2 \sin(\pi - 4)$ e) $18 (\cos(\pi - 4))^2$

27) Compute the derivative of

$$f(x) = \int_0^{x^2} \ln(t^2 + 1) \, dt$$

- a) $\ln(x^4 + 1)$ b) $2x \ln(x^4 + 1)$ c) $\frac{2x}{x^4 + 1}$ d) $2x \ln(x^2 + 1)$ e) $\ln(x^2 + 1)$

28) Determine

$$\frac{d}{dx} \ln(\ln(2 - \cos(x)))$$

- a) $\frac{\cos(x)}{(2 - \cos(x)) \ln(2 - \cos(x))}$ b) $\frac{\sin(x)}{\ln(2 - \cos(x))}$
 c) $\frac{\sin(x)}{(2 - \cos(x)) \ln(2 - \cos(x))}$ d) $\frac{\sin(x) (2 - \cos(x))}{\ln(2 - \cos(x))}$ e) $-\frac{\cos(x)}{\ln(2 - \cos(x))}$

- 1) d)
- 2) e)
- 3) b)
- 4) b)
- 5) e)
- 6) a)
- 7) c)
- 8) c)
- 9) b)
- 10) d)
- 11) c)
- 12) c)
- 13) c)
- 14) e)
- 15) a)
- 16) d)
- 17) a)
- 18) b)
- 19) a)
- 20) d)
- 21) b)
- 22) b)
- 23) a)
- 24) c)
- 25) d)
- 26) b)
- 27) b)
- 28) c)