

**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 $f(g(-2))$, given that

$$\left[f(x) = -2x + 1, g(x) = \frac{x}{x^2 + 1} \right]$$

- a) $\frac{5}{26}$ b) $\frac{9}{5}$ c) 2 d) $\frac{7}{5}$ e) $\frac{-1}{130}$

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) 6 b) 8 c) 12 d) 7 e) 9

3) Determine

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

- a) 1 b) $\frac{2}{3}$ c) $\frac{2}{5}$ d) 0 e) ∞

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

5) Given that

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

Determine the change in y with respect to x .

- a) $-\frac{9x^2 - 3y}{-3 + 8y}$ b) $-\frac{9x^2 - 3y}{-3x + 8y}$ c) $-\frac{9x^2 - 3}{-3x + 8y}$ d) $-\frac{9x^2 - 3}{-3 + 8y}$ e) $-\frac{6x - 3y}{-3x + 4}$

6) Compute the derivative of

$$4 \sec(x) - 5 \csc(x)$$

- a) $4(\sec(x))^2 + 5(\csc(x))^2$ b) $4 \csc(x) + 5 \sec(x)$ c) $4 \sec(x) \tan(x) + 5 \csc(x) \cot(x)$
 d) $4 \sec(x) \tan(x) - 5 \csc(x) \cot(x)$ e) $4(\tan(x))^2 + 5(\cot(x))^2$

7) Compute $\int_0^{\frac{1}{2}} \frac{4}{1+4t^2} dt$ a) 2π b) $\frac{1}{2}\pi$ c) $\frac{3}{2}\pi$ d) π e) 0

8) Determine $\frac{d}{dx} \left(\frac{3x^4 - 3x}{3x^4 + 3x} \right)$

a) $\frac{27x^2}{(3x^3 + 3)^2}$ b) $\frac{54x^2 - 1}{(3x^3 + 3)^2}$ c) $\frac{27x^2 - 1}{(3x^3 + 3)^2}$ d) $\frac{9x^2}{(3x^3 + 3)^2}$ e) $\frac{6x^2}{(1 + x^3)^2}$

9) Give the equation of the normal line to the graph of $y = 3x\sqrt{x^2 + 6} + 4$ at the point $(0, 4)$.
 a) $x + 3\sqrt{6}y = 4$ b) $3\sqrt{6}x + y = 4$ c) $-3\sqrt{6}x + y = 4$ d) $x + 3\sqrt{6}y = 12\sqrt{6}$ e) $x - 3\sqrt{6}y = -12\sqrt{6}$

10) Determine the concavity of the graph of $f(x) = 3\sin(x) + 2(\cos(x))^2$ at $x = \pi$.
 a) -4 b) -7 c) -6 d) 2 e) 4

11) Compute $\int -3x^2\sqrt{x^3 + 2} dx$
 a) $-\frac{2}{\sqrt{x^3 + 2}} + C$ b) $-2(x^3 + 2)^{(3/2)} + C$ c) $-\frac{1}{\sqrt{x^3 + 2}} + C$ d) $-\frac{2}{3}(x^3 + 2)^{(3/2)} + C$ e) $-\frac{4}{3}(x^3 + 2)^{(3/2)} + C$

12) Give the value of x where the function $f(x) = x^3 - \frac{33}{2}x^2 + 84x - 2$ has a local minimum.
 a) -4 b) -7 c) 4 d) 5 e) 7

13) The slope of the tangent line to the graph of $-3x^2 + cx + 3e^y = 3$ at $x = 0$ is 4. Give the value of c .
 a) 12 b) 3 c) 6 d) -12 e) -6

14) Compute $\int (2^x + 4e^{(2\ln(x))}) dx$
 a) $2^x \ln(2) + 2e^{(2\ln(x))} + C$ b) $\frac{2^x}{\ln(2)} + \frac{4}{3}x^3 + C$ c) $2^x \ln(2) + \frac{2e^{(2\ln(x))}}{x} + C$ d) $\frac{2^x}{\ln(2)} + 2e^{(2\ln(x))} + C$ e) $\frac{2^x}{\ln(2)} + 2x^2 + C$

15) What is the average value of the function $g(x) = (2x + 4)^2$ on the interval from $x = -4$ to $x = -1$?
 a) 4 b) -4 c) 10 d) 12 e) 7

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

$$f(t) = (2t^3 - 4t + 4) \sqrt{t^2 + 2t + 4}$$

17) Find the instantaneous rate of change of $f(t)$ at $t = 0$.

- a) -8 b) -1 c) -6 d) -5 e) -7/4

18) Compute

$$\frac{d}{dx} 3^{\cos(x)}$$

- a) $\sin(x) 3^{\cos(x)} \ln(3)$ b) $-\sin(x) 3^{\cos(x)} \ln(3)$ c) $-\sin(x) 3^{\cos(x)}$ d) $-\frac{\sin(x) 3^{\cos(x)}}{\ln(3)}$ e) $\frac{\sin(x) 3^{\cos(x)}}{\ln(3)}$

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

$$\lim_{x \rightarrow 0} \left(\frac{4x}{\sin(3x)} + \frac{x}{\cos(3x)} \right)$$

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

21) Given $y > 0$ and $\frac{dy}{dx} = \frac{3x^2 + 4x}{y}$ when $x = 0$?

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

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

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

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

23) Determine

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

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

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

25) Determine

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

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) $18 (\cos(\pi + 4))^2$

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

27) Compute the derivative of

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

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