Name: _____ **Class:** _____ **Date:** _____ **ID: A**

AP Calculus Chapter 5 Practice Test (complete)

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. Find the indefinite integral.

$\int 6xe^{4x^2}\,dx$

a. $\frac{3}{2}e^{4x^2}+C$ b. $\frac{3}{4}e^{4x^2}+C$ c. $48x^2e^{4x^2}+C$
d. $24xe^{4x^2}+C$ e. $\frac{3}{4}xe^{4x^2}+C$

2. Find $f'(t)$ if $f(t)=t^{10}10^{7t}$.

a. $f'(t)=10t^9 10^{7t}+70t^{10}10^{7t}$
b. $f'(t)=10t^9 10^{7t}+7t^{10}10^{7t-1}$
c. $f'(t)=10t^9 10^{7t}+7\ln(10)t^{10}10^{7t}$
d. $f'(t)=10t^9 70^{7t-1}$
e. $f'(t)=10t^9 10^{7t}+10^{7t-1}$

3. Find an equation of the tangent line to the graph of $y=\log_2 x$ at the point $(32,5)$.

a. $y=5+\frac{1}{\ln 2}(x-32)$ b. $y=5+\frac{1}{2\ln 32}(x-32)$
c. $y=5+\frac{1}{32\ln 2}(x-32)$ d. $y=5-\frac{1}{\ln 2}(x-32)$
e. $y=5+\frac{1}{32}(x-32)$

4. Use logarithmic differentiation to find $\frac{dy}{dx}$.

$y=x^{8x}$

a. $8x^{7x}$ b. $8x^{8x-1}$ c. $8x^{8x}\ln x$ d. $8(\ln x+1)$
e. $8x^{8x}(\ln x+1)$

5. Find the indefinite integral.

$\int 3^{8x}dx$

a. $\frac{1}{\ln 3}3^{8x}+C$ b. $\frac{1}{8\ln 3}3^{8x}+C$
c. $8(\ln 3)3^{8x}+C$ d. $\frac{1}{8}3^{8x}+C$ e. $\frac{\ln 3}{8}3^{8x}+C$

6. Find the following indefinite integral.

$\int x^7\left(4^{-x^8}\right)dx$

a. $\frac{-4^{-x^8}}{8\ln(4)}+C$ b. $\frac{-4^{-x^8}}{4\ln(8)}+C$ c. $\frac{-4^{-x^8+1}}{x^{8+1}}+C$
d. $\frac{-4^{-x^8}}{\ln(4)}+C$ e. $\frac{4^{-x^8}}{\ln(4)}+C$

7. Find the indefinite integral.

$\int \frac{1}{\sqrt{9-16x^2}}dx$

a. $\frac{1}{4}\arcsin\left(\frac{4x}{3}\right)+C$ b. $\frac{1}{4}\arcsin(9x)+C$
c. $4\arcsin(9x)+C$ d. $4\arcsin\left(\frac{4x}{3}\right)+C$
e. $\frac{1}{4}\arcsin(16x)+C$

8. Find the indefinite integral.

$$\int \frac{1}{x\sqrt{100x^2-81}}\,dx$$

a. $\frac{1}{9}\operatorname{arcsec}\left(\frac{9x}{10}\right)+C$ b. $9\operatorname{arcsec}\left(\frac{100x}{81}\right)+C$

c. $9\operatorname{arcsec}\left(\frac{9x}{10}\right)+C$ d. $\frac{1}{9}\operatorname{arcsec}\left(\frac{100x}{81}\right)+C$

e. $\frac{1}{9}\operatorname{arcsec}\left(\frac{10x}{9}\right)+C$

9. Find the indefinite integral.

$$\int \frac{1}{36+(x-4)^2}\,dx$$

a. $\frac{1}{36}\arctan\left(\frac{x-4}{36}\right)+C$

b. $36\arctan\left(\frac{x-4}{36}\right)+C$ c. $\frac{1}{6}\arctan\left(\frac{x-4}{6}\right)+C$

d. $\frac{1}{36}\arctan\left(\frac{x-4}{6}\right)+C$ e. $6\arctan\left(\frac{x-4}{6}\right)+C$

10. Find the integral $\int \frac{t}{t^4+81}\,dt$.

a. $\frac{1}{18}\arctan 9t^2\,dt+C$ b. $\frac{1}{18}\arctan\frac{t^2}{9}\,dt+C$

c. $\arctan\frac{t^2}{81}\,dt+C$ d. $\frac{1}{9}\arctan 81t^2\,dt+C$

e. $\arctan\frac{t^2}{9}\,dt+C$

11. Find the integral $\int \frac{\sin x}{13+\cos^2 x}\,dx$.

a. $-\frac{1}{13}\arctan\left(\cos x\sqrt{13}\right)+C$

b. $-\sqrt{13}\arctan\left(\frac{\sqrt{13}}{13}\cos x\right)+C$

c. $\sqrt{13}\arctan\left(\frac{\sqrt{13}}{13}\sin x\right)+C$

d. $\frac{\sqrt{13}}{13}\arctan\left(\frac{\sqrt{13}}{13}\sin x\right)+C$

e. $-\frac{\sqrt{13}}{13}\arctan\left(\frac{\sqrt{13}}{13}\cos x\right)+C$

12. Find the integral $\int \frac{15}{2\sqrt{x}\,(1+x)}\,dx$.

a. $\frac{30}{\arctan\left(\sqrt{x}\right)}+C$ b. $15\arctan\left(\sqrt{x}\right)+C$

c. $\frac{15}{2\arctan\left(\sqrt{x}\right)}+C$ d. $30\arctan\left(\sqrt{x}\right)+C$

e. $\frac{15}{\arctan\left(\sqrt{x}\right)}+C$

13. Find the integral $\int \frac{x-15}{x^2+1}\,dx$.

a. $15\ln\left(x^2+1\right)-\arctan(x)+C$

b. $\frac{1}{15\ln\left(x^2+1\right)}-15\arctan(x)+C$

c. $\frac{1}{2\ln\left(x^2+1\right)}+15\arctan(x)+C$

d. $\frac{1}{2}\ln\left(x^2+1\right)-15\arctan(x)+C$

e. $2\ln\left(x^2+1\right)-15\arctan(x)+C$

14. Evaluate the integral $\int_0^{1/6} \frac{16}{\sqrt{1-9x^2}}\,dx$.

a. $\frac{16}{25\pi}$ b. $\frac{8}{9}\pi$ c. $\frac{4}{9\pi}$ d. $\frac{16}{25}\pi$ e. $\frac{8}{9\pi}$

15. Evaluate the integral $\int_{\sqrt{3}}^{3} \frac{12}{9+x^2}\,dx$.

a. $\frac{2}{3\pi}$ b. $\frac{1}{3}\pi$ c. $\sqrt{\frac{1}{3}}\pi$ d. $\sqrt{\frac{1}{3\pi}}$ e. $\frac{2}{3}\pi$

16. Find the indefinite integral.

$$\int \frac{2x-4}{x^2+4x+13}\,dx$$

a. $\ln\left|x^2+4x+13\right| - \frac{8}{3}\arctan\left(\frac{x+2}{3}\right)+C$

b. $\ln\left|x^2+4x+13\right|+C$ c. $-\frac{8}{3}\arctan\left(\frac{x+2}{3}\right)+C$

d. $\ln\left|x^2+4x+13\right|+\frac{8}{3}\arctan\left(\frac{x+2}{3}\right)+C$

e. $\frac{8}{3}\arctan\left(\frac{x+2}{3}\right)+C$

17. Find the indefinite integral.

$$\int \frac{dx}{\sqrt{-x^2-18x}}$$

a. $\arcsin\left(\frac{x+18}{18}\right)+C$ b. $\arcsin\left(\frac{x+9}{9}\right)+C$

c. $\arcsin\left(\frac{x-18}{18}\right)+C$ d. $\arcsin\left(\frac{x-9}{9}\right)+C$

e. $\arcsin\left(\frac{x+9}{18}\right)+C$

18. Use the differential equation $\frac{dy}{dx} = \frac{6}{\sqrt{64-x^2}}$ and the initial condition $y(0) = \pi$ to find y.

a. $y = 6\arccos(64x) + \pi$

b. $y = 6\arcsin\left(\frac{1}{8}x\right) + \pi$

c. $y = 6\arccos\left(\frac{1}{8}x\right) + \pi$

d. $y = 6\arccos\left(\frac{1}{64}x\right) + \pi$

e. $y = 6\arcsin(8x) + \pi$

19. Use the differential equation $\frac{dy}{dx} = \frac{1}{81+x^2}$ and the initial condition $y(9) = \pi$ to find y.

a. $y = \frac{1}{9}\arcsin\left(\frac{x}{9}\right) + \frac{\pi}{36}$

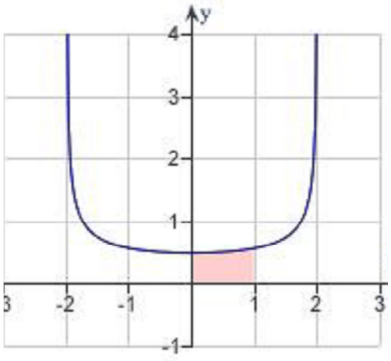
b. $y = \frac{1}{36}\arctan\left(\frac{x}{9}\right) + \frac{17\pi}{81}$

c. $y = \frac{1}{9}\arctan\left(\frac{x}{9}\right) + \frac{35\pi}{36}$

d. $y = \frac{1}{81}\arctan\left(\frac{x}{9}\right) + \frac{\pi}{36}$

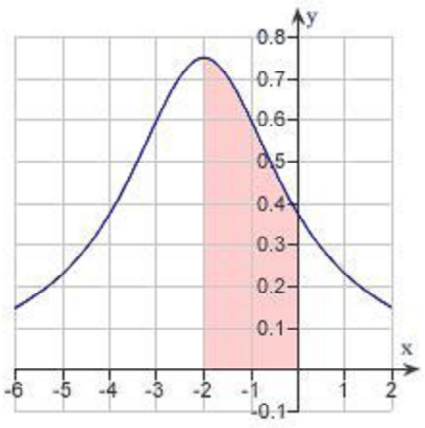
e. $y = \frac{1}{81}\arcsin\left(\frac{x}{9}\right) + \frac{35\pi}{36}$

20. Find the area of the shaded region for the function $y = \dfrac{1}{\sqrt{4-x^2}}$.



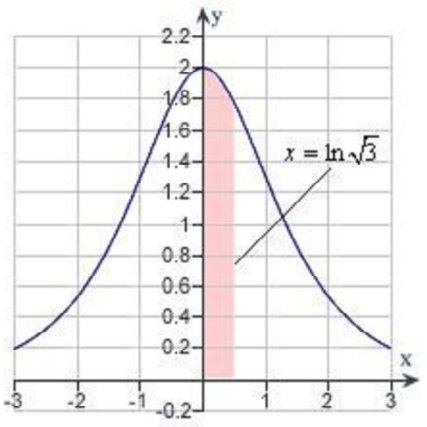
a. $\dfrac{\pi}{2}$ b. $\dfrac{\pi}{3}$ c. $\dfrac{5\pi}{6}$ d. $\dfrac{2\pi}{3}$ e. $\dfrac{\pi}{6}$

21. Find the area of the shaded region for the function $y = \dfrac{3}{x^2+4x+8}$.



a. $\dfrac{\pi}{2}$ b. $\dfrac{\pi}{4}$ c. $\dfrac{3\pi}{8}$ d. $\dfrac{5\pi}{8}$ e. $\dfrac{\pi}{8}$

22. Find the area of the shaded region for the function $y = \dfrac{4e^x}{1+e^{2x}}$.



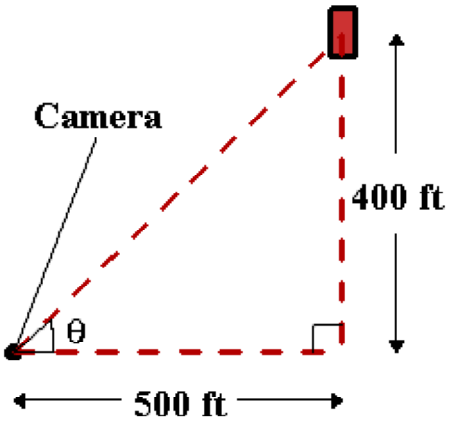
a. $\dfrac{\pi}{6}$ b. $\dfrac{\pi}{3}$ c. $\dfrac{\pi}{12}$ d. $\dfrac{\pi}{4}$ e. $\dfrac{5\pi}{12}$

Short Answer

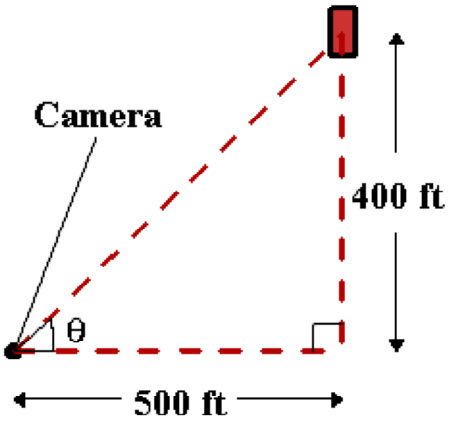
1. Find the derivative of the function $f(x) = 10\arcsin(x-9)$.

2. Find the derivative of the function $f(x) = \operatorname{arcsec}(8x)$.

3. In a free-fall experiment, an object is dropped from a height of 400 feet. A camera on the ground 500 feet from the point of impact records the fall of the object as shown in the figure. Assuming the object is released at time $t = 0$. At what time will the object reach the ground level?



4. In a free-fall experiment, an object is dropped from a height of 400 feet. A camera on the ground 500 feet from the point of impact records the fall of the object as shown in the figure. Assuming the object is released at time $t = 0$. Find the rate of change of the angle of elevation of the camera when $t = 3$. Round your answer to four decimal places.



5. Find an equation of the tangent line to the graph of $y = \ln\left(x^{13}\right)$ at the point (1,0).

6. Differentiate the function $f(x) = \ln\left(5x^2 + 3x + 13\right)$.

7. Find the derivative of the function $y = \ln\left(x\sqrt{x^2 + 15}\right)$.

8. Find the derivative of the function $y = \ln\left(\ln x^{79}\right)$.

9. Use implicit differentiation to find $\frac{dy}{dx}$.

   $x^4 + 7\ln y = 3$

10. Use implicit differentiation to find $\frac{dy}{dx}$ at the point $(6,1)$.

    $2xy - \ln y = 12$

11. Find the indefinite integral $\int \frac{x^2}{4x^3 + 5}\,dx$.

12. Find $\int \frac{x^2 - 20x + 10}{x + 14}\,dx$.

13. Find the indefinite integral $\int \frac{(\ln x)^{14}}{x}\,dx$.

14. Find $\int \frac{1}{x\ln\left(x^2\right)}\,dx$.

15. Find the solution of the differential equation $\frac{dr}{dt} = \frac{\sec^2 t}{\tan t + 1}$ which passes through the point $(\pi,3)$.

16. Use integration to find the particular solution of the differential equation $\frac{dy}{dx} = \frac{\ln x}{x}$ which passes through the point $(1,-3)$.

17. Find $F'(x)$ if $F(x) = \int_{1}^{11x^9} \frac{1}{t}\,dt$.

18. Find an equation of the tangent line to the graph of $y = e^{7x}$ at the point $(0,1)$.

19. Find $\frac{dy}{dx}$ if $y = e^{4x^3}$.

20. Find the derivative of the function $f(x) = x^3 e^x$.

21. Find the derivative of the function $f(x) = \frac{e^x - 1}{e^x + 1}$.
    Simplify your answer.

22. Find the indefinite integral.

    $\int e^{-7x}\,dx$

23. Find the indefinite integral $\int e^{6x^6} x^5\,dx$.

AP Calculus Chapter 5 Practice Test (complete)
Answer Section

MULTIPLE CHOICE

1. B
2. C
3. C
4. E
5. B
6. A
7. A
8. E
9. C
10. B
11. E
12. B
13. D
14. B
15. B
16. A
17. B
18. B
19. C
20. E
21. C
22. B

SHORT ANSWER

1. $f'(x) = \dfrac{10}{\sqrt{18x - x^2 - 80}}$
2. $\dfrac{1}{|x|\sqrt{64x^2 - 1}}$
3. 5 seconds
4. –0.1521 rad/sec
5. $y = 13(x - 1)$
6. $\dfrac{10x + 3}{5x^2 + 3x + 13}$
7. $\dfrac{1}{x} + \dfrac{x}{x^2 + 15}$

8. $\dfrac{dy}{dx} = \dfrac{79}{x \ln\left(x^{79}\right)}$

9. $-\dfrac{4x^3 y}{7}$

10. $-\dfrac{2}{11}$

11. $\dfrac{1}{12}\ln\left|4x^3 + 5\right| + C$

12. $\dfrac{1}{2}x^2 - 34x + 486\ln|x + 14| + C$

13. $\dfrac{(\ln x)^{15}}{15} + C$

14. $\displaystyle\int \frac{1}{x \ln\left(x^2\right)}\,dx = \frac{1}{2}\ln\left|\ln\left(x^2\right)\right| + C$

15. $r = \ln|\tan t + 1| + 3$

16. $y = \dfrac{(\ln x)^2}{2} - 3$

17. $F'(x) = \dfrac{9}{x}$

18. $y = 7x + 1$

19. $\dfrac{dy}{dx} = 12x^2 e^{4x^3}$

20. $x^2 e^x (x + 3)$

21. $\dfrac{2e^x}{\left(e^x + 1\right)^2}$

22. $-\dfrac{1}{7}e^{-7x} + C$

23. $\dfrac{1}{36}e^{6x^6} + C$