

1. Find $f'(x)$ if $f(x) = \sin(e^{5x}) + (\sin(e^x))^5$.
2. Use implicit differentiation to find y' if $9y^4 - 5x^2 + \ln(xy) = 2$.
3. Find $\int x 2^{-2x^2} dx$.
4. Find $\int_1^2 \frac{x+1}{x^2+2x} dx$.
5. Where does the graph of $f(x) = 5x^4 - x^5$ have a point(s) of inflection?
6. If $f(x) = |x - 3|$, find $f'(3)$.
7. Find the critical numbers of $f(t) = \frac{\ln(t)}{t}$.
8. At $x = 0$, which of the following is true for $f(x) = x^2 + e^{-2x}$:
 - (a) f is increasing
 - (b) f is decreasing
 - (c) f is discontinuous
 - (d) f has a local min
 - (e) f has a local max
9. Find $\frac{d}{dx}(\sin(x))^x$.
10. Find y' if $y = \ln(\sec(x))$.
11. Find y' if $y = \ln(e^{2x})$.
12. Find the area bounded by $y = e^{2x}$, $x = 0$, $x = 2$, and $y = 0$.
13. Is $\int_0^0 \sqrt{x^2 - 2x} dx$.
 - (a) -1
 - (b) $-\frac{1}{2}$
 - (c) $\frac{1}{2}$
 - (d) 1
 - (e) none of these

14. If $f'(x) = \tan(x)$, find $f(x)$.
15. Find $\int_{\pi/4}^{\pi/2} \frac{\cos(x)}{\sin(x)} dx$.
16. Use Newton's law of cooling to find **when** the temperature of my brownies will reach 200° if they start at 325° in my 65° kitchen and cool to 285° in 10 minutes.
17. Find the arc length of $y = x^2 - \frac{1}{8} \ln(x)$ for $1 \leq x \leq 3$.
18. Find the x -values of $f(x) = \cos(x) - \sin(x)$ on $[0, 2\pi]$ where the tangent line has slope zero.
19. Find the volume if the area bounded by $y = \frac{1}{x}$, $y = 0$, $x = 1$, and $x = 2$ is revolved about the x -axis.
- (a) 4π
 (b) 2π
 (c) 3π
 (d) $\frac{\pi}{2}$
 (e) none of these
20. Find $\frac{d}{dx} (\log_3(\cos(\tan^{-1}(x))))$.

Answers

- 1) $\cos(e^{5x})(5e^{5x}) + 5(\sin(e^x))^4(\cos(e^x))e^x$ 11) 2
- 2) $y' = \frac{10x - \frac{1}{x}}{36y^3 + \frac{1}{y}}$ 12) $\frac{1}{2}(e^4 - 1)$
- 3) $-\frac{1}{4} \frac{2^{-2x^2}}{\ln(2)} + C$ 13) E
- 4) $\frac{1}{2} \ln(8/3)$ 14) $f(x) = \ln |\sec(x)| + C$
- 5) (3, 162) 15) $-\ln \left| \frac{\sqrt{2}}{2} \right|$
- 6) DNE 16) $t = 39.2$
- 7) $t = e$ 17) $8 + \frac{\ln(3)}{8}$
- 8) B 18) $x = \frac{3\pi}{4}$ and $x = \frac{7\pi}{4}$
- 9) $y' = (\sin(x))^x (\ln(\sin(x)) + x \cot(x))$ 19) D
- 10) $y' = \tan(x)$ 20) $\left(\frac{-\sin(\tan^{-1}(x))}{\cos(\tan^{-1}(x)) \ln(3)} \right) \left(\frac{1}{1+x^2} \right)$