

East Los Angeles College
Department of Mathematics
Math 261
Practice Test 2

Your in-class test will not be this long and will have less questions. However, this is a good reference for your Test 2 as we covered this material

1. Use the definition of derivative to differentiate the following.

$$f(x) = x^2 - 5x + 4$$

Let $s(t) = \frac{t}{t^2+1}$ be a position function measured in meters where t is measured in seconds and $t \geq 0$

2. Determine the average velocity over the interval $[1,3]$
3. Determine the initial position.
4. Determine the velocity function.
5. Determine the initial velocity.
6. Determine the velocity at $t=3$ seconds.
7. Determine the direction of travel at $t=3$ seconds.
8. Determine the speed at $t=3$ seconds.
9. At what time t does the particle stop?
10. For what time interval t is the particle moving to the right?
11. For what time interval t is the particle moving to the left?

Let $s(t) = 2\sin(3\pi t) + 1$ represent the displacement of a weight on a vibrating spring in cm with t being time in seconds.

Determine the:

12. Initial position of the weight.
13. The position of the weight at time $t = \frac{1}{4}$ seconds
14. The velocity function for the weight.
15. Initial velocity.
16. The velocity of the weight at time $t = \frac{1}{4}$ seconds
17. The speed of the weight at time $t = \frac{1}{4}$ seconds
18. The acceleration function.
19. Initial acceleration.
20. The acceleration of the function at $t = \frac{1}{4}$ seconds.
21. Is the particle slowing up or slowing down at $t = \frac{1}{4}$ seconds?

22. Show that $f(x) = |x - 3|$ is not differentiable at $x = 3$

23. Determine points on the graph where $f(x) = 12x - x^3$ are horizontal.

24. Determine the equation of the line tangent to the curve at the indicated point.

$$f(x) = \frac{\sin(x) - \cos(x)}{x} \text{ at } x = \frac{\pi}{4}$$

25. Determine the values of x where $f(x) = \sin(x) \cos(x)$ over the interval $0 \leq x \leq 2\pi$ has a horizontal tangent.

26. Use implicit differentiation to find the equation tangent to the curve at the indicated point.

$$y^4 + xy = x^3 - x + 2 \text{ at } (1,1)$$

27. Use implicit differentiation to find the equation tangent to the curve at the indicated point.

$$\sqrt{2}\cos(x + y) = \cos(x) + \cos(y) \text{ at } \left(\frac{\pi}{4}, \frac{\pi}{4}\right)$$

Differentiate the following using Chain Rule

28. $y = (x + 5)^2(x - 3)^4$

29. $y = \sqrt{4x - 15}$

30. $y = x\sqrt{x^2 + 4}$

31. $y = \cos\left(\frac{x}{x+1}\right)$

32. $y = \sin^4(x)$

33. $y = (4 - x^2)^{3/4}$

Determine the first and second derivatives for the following functions.

34. $y = \tan(x^2)$

35. $y = x^{-\frac{5}{2}} - x + 4$

36. $y = \sqrt{2x + 3}$

37. $y = 4x^3 - 2x^2 + 3x - 8$

38. $y = \frac{4x}{x+1}$