East Los Angeles College
Department of Mathematics
Math 261
Test 2 Study Guide

Show Work for Credit

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

$$f(x) = x^3 - x$$

Let $s(t) = \frac{1}{3}t^3 - \frac{5}{2}t^2 + 4t + 3$ be a position function measured in meters where t is measured in seconds.

2. Determine the average velocity over the interval $[1,2]$
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=4 seconds.
9. At what time(s) 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?

12. Show that $f(x) = |x-2|$ is not differentiable at $x = 2$

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

$$y = 2x - \sqrt[3]{x} + 4\cos(x) - 3 \text{ at } (0,1)$$

14. Determine the points of horizontal tangents for $y = \cos(x) - \cos^2(x)$ over $0 \le x \le 2\pi$

Differentiate the following functions.

15. $f(x) = \sqrt{5 - x^2}$

16. $f(x) = (x^3 - 8)\left(x^2 + 5\right)$

17. $f(x) = (2x-5)^3(x+3)^2$

18. $f(x) = \frac{\sqrt{x}}{x+1}$

19. $f(x) = (x-3)^2 + 4\sec(x^2) - \frac{1}{x^2} + 3$

20. $f(x) = \frac{\tan(5x)}{x}$