

Calculus Review – Unit 2

Find the derivative for each of the following functions:

1. $y = \frac{\cos x}{1-x}$

2. $y = x^2 \tan x$

3. $f(x) = \csc x + \cot x$

4. $y = \frac{2}{x} - \frac{x}{2}$

5. $g(x) = (x^2 + 2x)(x - 1)$

6. Write the equation of the line tangent to $y = 4 \cos x$ at $x = \frac{\pi}{4}$.

7. Write the equation of the line normal to $y = \frac{x}{\tan x}$ at $x = \frac{\pi}{4}$.

8. Write the equation of the line tangent to $y = \sin x$ and parallel to $y = x + 7$ if $-\frac{\pi}{2} < x < \frac{\pi}{2}$

9. Write the equation of the horizontal tangent to $f(x) = x^2 + 2x - 7$.

For #10 – 16, use the position function given below:

$$x(t) = t^3 - 9t^2 + 24t$$

10. Find the velocity and acceleration functions.

11. When does the object change direction?

12. When is the object moving left?

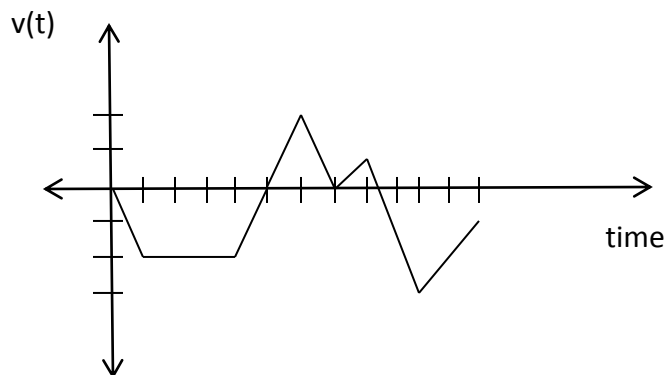
13. Find the object's displacement from $t = 0$ to $t = 3$.

14. Find the total distance traveled from $t = 0$ to $t = 3$.

15. When is the object's velocity increasing?

16. When is the object's speed increasing?

For #17-23, use the velocity graph given below:



17. When is the object at rest?
18. When does the object change direction?
19. When is the object moving right?
20. When is the object's acceleration zero?
21. When is the speed of the object the greatest?
22. When is the object's acceleration the greatest?
23. Sketch a graph of the object's acceleration.

Answers:

1. $y' = \frac{-\sin x + x \sin x + \cos x}{(1-x)^2}$

2. $y' = x^2 \sec^2 x + 2x \tan x$

3. $f'(x) = -\csc x \cot x - \csc^2 x$

4. $y' = \frac{-2}{x^2} - \frac{1}{2}$

5. $g'(x) = 3x^2 + 2x - 2$

6. $y - 2\sqrt{2} = -2\sqrt{2} \left(x - \frac{\pi}{4}\right)$

7. $y - \frac{\pi}{4} = \frac{-1}{\left(1 - \frac{\pi}{2}\right)} \left(x - \frac{\pi}{4}\right)$

8. $y = x$

9. $y = -8$

10. $v(t) = 3t^2 - 18t + 24, a(t) = 6t - 8$

11. $t = 2, t = 4$

12. (2, 4)

13. 18 units

14. 22 units

15. $t > 3$

16. $(2, 3) \cup (4, \infty)$

17. $t = 0, 5, 7, 8.2$

18. $t = 5, 8.2$

19. $(5, 8.2), t \neq 7$

20. (1,4)

21. $t = 10$

22. (4,6)

23.

