

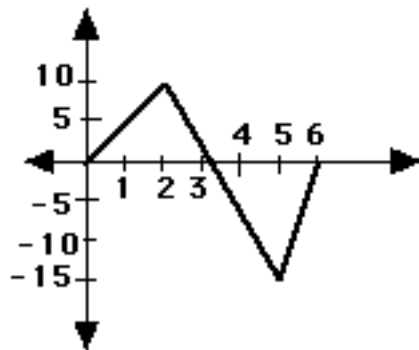
**CALCULUS I – Worksheet #63**

1. (Free Response – calculator NOT allowed) Consider the curve defined by  $y^4 = y^2 - x^2$ .
- Verify that  $\frac{dy}{dx} = \frac{x}{y - 2y^3}$ .
  - Write the equation for any horizontal tangents of the curve.
  - Write the equation for any vertical tangents of the curve.
  - At what ordered pair  $(x,y)$  is the line  $4x\sqrt{3} - 4y = 1$  tangent to the curve  $y^4 = y^2 - x^2$ ?

2. If  $f(x) = \tan(e^{\sin x})$ , then  $f'(x) =$
- A)  $-e^{\sin x} \cos x \sec^2(e^{\sin x})$     B)  $e^{\sin x} \cos x \sec^2(e^{\sin x})$     C)  $-e^{\sin x} \sec(e^{\sin x}) \tan(e^{\sin x})$   
 D)  $e^{\sin x} \sec^2(e^{\sin x})$     E)  $e^{\sin x} \sec(e^{\sin x}) \tan(e^{\sin x})$

3. If  $F(x) = \int_2^{x^2} t^2 dt$ , then  $F(2) =$     A)  $\frac{64}{3}$     B) 64    C)  $\frac{16}{3}$     D) 16    E)  $\frac{56}{3}$

Questions 4 and 5 refer to the graph below of the velocity of a moving object as a function of time.



4. At what time has the object reached its maximum speed?    A) 0    B) 2    C) 3    D) 5    E) 6
5. Over what interval does the object have the greatest acceleration?  
 A) [0,2]    B) [2,3]    C) [2,4]    D) [3,5]    E) [5,6]
6. The function  $f$  is given by  $f(x) = x^4 - 8x^3 + 24x^2 - 32x + 15$ .  
 All of these statements are true EXCEPT:  
 A) 1 and 3 are zeros of  $f$ .  
 B)  $f'(2) = 0$   
 C)  $f''(2) = 0$   
 D)  $(2,-1)$  is a point of inflection of  $f$ .  $(2,-1)$  is a local minimum of  $f$ .

7. Let  $f$  be the function given by  $f(x) = \frac{3x^3}{e^x}$ . For what value of  $x$  is the slope of the line tangent to  $f$  equal to  $-1.024$ ?  
 A)  $-9.004$     B)  $-4.732$     C) 1.029    D) 1.277    E) 4.797

8. The graph of the function  $y = x^5 - x^2 + \sin x$  changes concavity at  $x =$   
 A) 0.324    B) 0.499    C) 0.506    D) 0.611    E) 0.704