**Practice with Transcendental Functions 2-17-2017 ICMAB**

1. A particle moves along the x-axis so that at any time t > 0 its velocity is given by v(t) = t ln t - t.
2. Write an expression for the acceleration of the particle.
3. For what values of t is the particle moving to the right?
4. What is the minimum velocity of the particle? Show the analysis that leads to your conclusion.
5. A particle moves along the x-axis so that its velocity v at any time t, for 0 < t <16, is given by v(t) = e2 sin t – 1. At time t = 0, the particle is at the origin.

1. During what intervals of time is the particle moving to the left? Give a reason for your answer.
2. Find the total distance traveled by the particle from t = 0 to t = 4.

 c. Is there any time t, 0 < t <16, at which the particle returns to the origin? Justify your answer.

A particle moves along the x-axis with velocity at time t > 0 given by

3. 

 a. Find the acceleration of the particle at time t = 3.

 b. Is the speed of the particle increasing at time t = 3? Give a reason for

 your answer.

 c. Find all values of t at which the particle changes directions. Justify your

 answer.

 d. Find the total distance traveled by the particle over the time interval

1. < t < 3.
2. Let f and g and their inverses f-1 and g-1 be differentiable functions and let the values of f, g, and the derivatives f′ and g′ at x = 1 and x = 2 be given by the table below:

|  |  |  |
| --- | --- | --- |
|  | 1 | 2 |
|  | 2 | 3 |
|  | 2 |  |
|  | 5 | 6 |
|  | 4 | 7 |

 Determine the value of each of the following:

1. The derivative of f + g at x = 2.
2. The derivative of fg at x = 2.
3. The derivative of f/g at x = 2.
4. h'(1) where h(x) = f(g(x)).
5. The derivative of g-1 at x = 2.
6. A particle moves along the x-axis with acceleration given by  for t > 1.
7. Write an expression for the velocity v(t), given that v(1) = 9.

 b. For what values of t, 1 < t < 3, is the velocity a maximum?