AP Calculus

Technology Tuesday #1

Name: _____

Date: _____ Per: _____

1)

For $0 \le t \le 6$, a particle is moving along the x-axis. The particle's position, $x(t)$, is not explicitly given. The velocity of the particle is given by $v(t) = 2\sin\left(e^{t/4}\right) + 1$. The acceleration of the particle is given by $a(t) = \frac{1}{2}e^{t/4}\cos\left(e^{t/4}\right)$ and $x(0) = 2$.

(a) Is the speed of the particle increasing or decreasing at time $t = 5.5$? Give a reason for your answer.

(b) Find the average velocity of the particle for the time period $0 \le t \le 6$.

(c) Find the total distance traveled by the particle from time $t = 0$ to $t = 6$.

(d) For $0 \le t \le 6$, the particle changes direction exactly once. Find the position of the particle at that time.

2)

The function g is defined for $x > 0$ with $g(1) = 2$, $g'(x) = \sin\left(x + \frac{1}{x}\right)$, and $g''(x) = \left(1 - \frac{1}{x^2}\right)\cos\left(x + \frac{1}{x}\right)$.

(a) Find all values of x in the interval $0.12 \le x \le 1$ at which the graph of g has a horizontal tangent line.

(b) On what subintervals of $(0.12, 1)$, if any, is the graph of g concave down? Justify your answer.

(c) Write an equation for the line tangent to the graph of g at $x = 0.3$.

(d) Does the line tangent to the graph of g at $x = 0.3$ lie above or below the graph of g for $0.3 < x < 1$? Why?

3) If $f(x) = x^{-3} + 3\sqrt{x} + 5\pi - e^2$, then $f'(x) =$

(A) $\frac{3}{2\sqrt{x}} - 3x^4$

(B) $\frac{3}{2}x^{\frac{1}{2}} - 3x^{-4}$

(C) $3x^{-4} + \frac{3}{2\sqrt{x}}$

(D) $-\frac{3}{x^4} + \frac{3}{2\sqrt{x}}$

(E) $3x^2 + \frac{3}{2\sqrt{x}}$

4) Approximate the area under the curve $y = x^2 + 2$ from $x = 1$ to $x = 2$ using four inscribed trapezoids.

(A) 4.333

(B) 3.969

(C) 4.719

(D) 4.344

(E) 4.328

5) When is the particle whose path is described by $x(t) = 2t^3 - \frac{21}{2}t^2 + 9t - 16$, from $t > 0$, slowing down?

(A) $0 < t < 3$

(B) $\frac{7}{4} < t < 3$

(C) $\frac{1}{2} < t < \frac{7}{4}$

(D) $\frac{1}{2} < t < 3$