Name: _____ Date: _____
AP Calc AB: Calculator Active Questions Ms. Loughran

1. The function f defined by $f(x) = e^{3x} + 6x^2 + 1$ has a horizontal tangent at $x =$

   (A) –0.144 (B) –0.150 (C) –0.156 (D) –0.162 (E) –0.168

2. Let $f(x) = 2e^{3x}$ and $g(x) = 5x^3$. At what value of x do the graphs of f and g have parallel tangents?

   (A) –0.445 (B) –0.366 (C) –0.344 (D) –0.251 (E) –0.165

3. Let f be the function given by $f(x) = 5e^{3x^3}$. For what positive value of a is the slope of the line tangent to the graph of f at $(a, f(a))$ equal to 6?

   (A) 0.142 (B) 0.344 (C) 0.393 (D) 0.595 (E) 0.714

4. An object moves along the x-axis so that at time t, $t \geq 0$, its position is given by $x(t) = t^4 + t^3 - 30t^2 + 88t$. At the instant when the acceleration becomes zero, the velocity of the object is approximately

   (A) 244 (B) 12 (C) 0 (D) −12 (E) –24

5. A particle moves along the x-axis so that its position at any time $t \geq 0$ is given by $x(t) = \dfrac{t}{t^2 + 4}$. The particle is at rest when $t =$

(A) 0 (B) $\dfrac{1}{4}$ (C) 1 (D) 2 (E) 4

6. A particle moves along the x-axis so that its velocity v at time t, for $0 \leq t \leq 5$, is given by $v(t) = \ln\left(t^2 - 3t + 3\right)$. The particle is at position $x = 8$ at $t = 0$. Find the acceleration of the particle at time $t = 4$.

7. An object moves along the x-axis with initial position $x(0) = 2$. The velocity of the object at time $t \geq 0$ is given by $v(t) = \sin\left(\dfrac{\pi}{3}t\right)$. What is the acceleration of the object at time $t = 4$?

8. The position of a particle moving on the x-axis at time $t > 0$ seconds is $x(t) = e^t - \sqrt{t}$.

(a) Find the average velocity of the particle over the interval $1 \le t \le 3$.
(b) In what direction and how fast is the particle moving at $t = 1$ seconds?
(c) For what values of t is the particle moving to the right?
(d) Find the position of the particle when its velocity is zero.