AP Calc AB **Name**_____

Do not use a calculator for the following problems.
Multiple Choice.

1. The slope of the curve $y^3 - xy^2 = 4$ at the point where y = 2 is

A) -2 B) $\frac{1}{4}$ C) $-\frac{1}{2}$ D) $\frac{1}{2}$ E) 2

2. The slope of the curve $y^2 - xy - 3x = 1$ at the point (0,-1) is

A) -1 B) -2 C) 1 D) 2 E) -3

3. The equation of the tangent to the curve $y = x\sin x$ at the point $\left(+\frac{\pi}{2}, \frac{\pi}{2}\right)$

A) $y = x - \pi$ B) $y = \frac{\pi}{2}$ C) $y = \pi - x$ D) $y = x + \frac{\pi}{2}$ E) $y = x$

4. The tangent to the curve of $y = xe^{-x}$ is horizontal when x is equal to

A) 0 B) 1 C) -1 D) $\frac{1}{e}$ E) none of these

5. The point on the curve $y = \sqrt{2x+1}$ at which the normal(perpendicular line) is parallel to the line $y = -3x + 6$ is

A) $(4,3)$ B) $(0,1)$ C) $\left(1,\sqrt{3}\right)$ D) $(4,-3)$ E) $\left(2,\sqrt{5}\right)$

6. The tangent to the curve $y^2 - xy + 9 = 0$ is vertical when

A) $y = 0$ B) $y = \pm\sqrt{3}$ C) $y = \frac{1}{2}$ D) $y = \pm 3$ E) none of these

7. If differentials are used for computation, then the best approximation, in cubic inches, to the increase in volume of a sphere($V = \frac{4}{3}\pi r^3$)when the radius is increased from 3 to 3.1 in. is

A) 11.3 B) 11.7 C) 12.1 D) 33.9 E) 39.7

8. If m_1 is the slope of the curve $xy = 2$ and m_2 is the slope of the curve $x^2 - y^2 = 3$, then at a point of intersection of the two curves

A) $m_1 = -m_2$ B) $m_1 m_2 = -1$ C) $m_1 = m_2$ D) $m_1 m_2 = 1$ E) $m_1 m_2 = -2$

9. The line $y = 3x + k$ is tangent to the curve $y = x^3$ when k is equal to

A) 1 or -1 B) 0 C) 3 or -3 D) 4 or -4 E) 2 or -2

10. A particle moves along a horizontal line according to the law $s = t^4 - 6t^3 + 12t^2 + 3$. The particle is at rest when t is equal to

A) 1 or 2 B) 0 C) $\frac{9}{4}$ D) 0, 2, or 3 E) none of these

11. If a particle moves along a line according to the law $s = t^5 + 5t^4$, then the number of times it reverses direction is

A) 0 B) 1 C) 2 D) 3 E) 4

Free Response

12. Consider the curve given by the equation $y^3 + 3x^2 y + 13 = 0$.

a) Find $\frac{dy}{dx}$.

b) Write an equation for the line tangent to the curve at the point (2,-1).