$\boxed{\text{UNIT 5}}$ TEST – AP Calculus Name: practice PT

A Graphing Calculator and all its functions (including Math 9, tables, and graphs) are allowed, except for problems #1 to #4. BE HONEST!!!

Evaluate the limits algebraically. **Do not use your calculator**. You may use L'Hôpital's Rule.

1. $\lim\limits_{x \to 0} \dfrac{x}{\sin 8x}$

2. $\lim\limits_{x \to 0} \dfrac{\cos^2 4x}{x^2 \cot^2 3x}$

3. $\lim\limits_{x \to 0} \dfrac{5x^2}{\cos 2x - 1}$

4. $\lim\limits_{x \to 0} \dfrac{x^2}{\sec x - 1}$

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For each pair of parametric equations, (a) write the equation in terms of x and y; and (b) sketch the graph.

6. $x(t) = t^2$ and $y(t) = 2t + 1$

7. $x(t) = 3\cos t$ and $y(t) = 4\sin t$

8. Find the polar coordinates of the point with the given rectangular coordinates.

a. (-8 , 15)

b. $(-2\sqrt{3}\ , -2)$

9. Find the rectangular coordinates of the point with polar coordinates.

a. $\left(3 , -\frac{4\pi}{3} \right)$

b. $\left(5 , \frac{\pi}{4} \right)$

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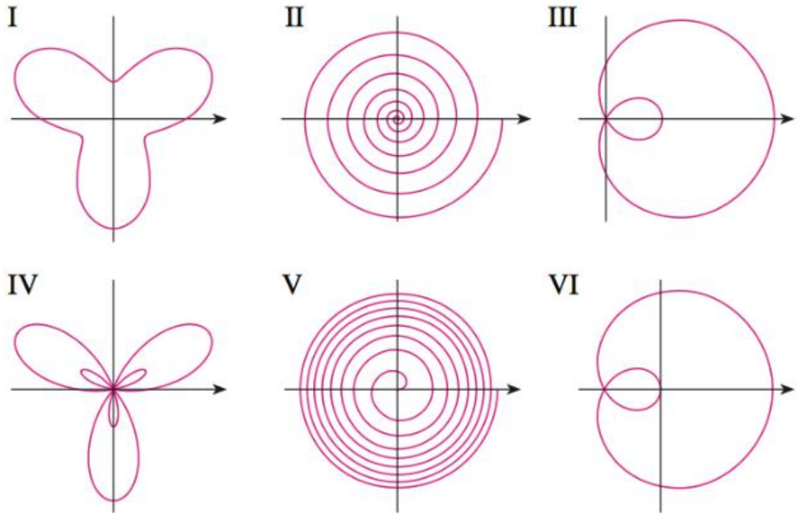
10. Match the polar equations with the graphs labeled I–VI. Give reasons for your choices. (Don't use a graphing device.)

(a) $r = \sqrt{\theta}, \quad 0 \leqslant \theta \leqslant 16\pi$ (b) $r = \theta^2, \quad 0 \leqslant \theta \leqslant 16\pi$

(c) $r = \cos(\theta/3)$ (d) $r = 1 + 2\cos\theta$

(e) $r = 2 + \sin 3\theta$ (f) $r = 1 + 2\sin 3\theta$



11. Write the rectangular equations in polar form.

a. $y = 3x$ b. $x^2 + y^2 = 25$

12. Write the polar equations in rectangular form.

a. $r = 2\csc\Theta$ b. $r = -4\sin\Theta$

For each initial point A and terminal point B, (a) find the component form of each vector, (b) represent each vector in unit vector form, and (c) find the magnitude of each vector || **v** ||.

13. A(3 , 1) to B(0 , 8)
   a)

   b)

   c)

14. A(2 , -1) to B(-3 , 4)
   a)

   b)

   c)

Consider the vectors $\mathbf{y} = \langle -1, 4 \rangle$ and $\mathbf{z} = \langle 3, -2 \rangle$. Represent each resulting vector in unit vector form.

15. **v = y + z**

16. **v = 2y - z**

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17. Graph the vector curve and write the parametric equations in rectangular form.

$\mathbf{r}(t) = (t - 1)\,\mathbf{i} + t^2\,\mathbf{j}$