Name _____   Period _____   Date _____   Score _____

Calculus BC Practice Exam Chapter 11

**A calculator may be used on all problems, but answers should be written in exact form.
Whenever possible, problems should be attempted analytically before using the calculator.**

1. A curve is parametrized by $x = t^2 + 5$ and $y = e^{2t}$.

1. $\dfrac{dy}{dx} =$ _____

Find $\dfrac{dy}{dx}$ and $\dfrac{d^2 y}{dx^2}$ in terms of t. Express using positive exponents.

$\dfrac{d^2 y}{dx^2} =$ _____

2. Find the length of the curve parametrized by

2. _____

$x = \dfrac{1}{6}(4t+1)^{\frac{3}{2}}, \ y = t^2 \ , \ 1 \le t \le 5$

3. Let $u = \langle 2,-1 \rangle$ and $v = \langle -5, 7 \rangle$

    (a) Find $3u + v$

    (b) Find the magnitude of $3u + v$

3. (a) _____

   (b) _____

4. An airplane, flying in the direction 35° west of north at 425 mph in still air, encounters a 55-mph wind blowing from the west (i.e. the   wind direction is due east). The airplane maintains its air speed and compass heading, but, because of the wind, acquires a new ground speed and direction. What are they?

4. Ground speed _____

Direction: _____

5. The position vector of a particle in the plane is given by

$r(t) = \langle \ln(t + 2), (t^2 - 2) \rangle$ for $-2 \le t \le 2$.

(a) Find the velocity vector

(b) Find the acceleration vector.
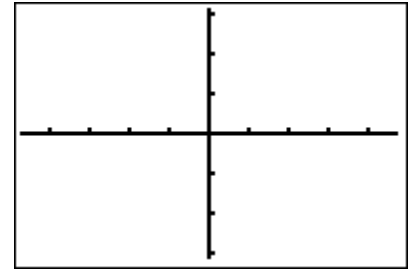
5(a) v(t) = _____

5b). a(t)= _____

6. Find the magnitude of the vector and the direction angle θ it forms with the positive x-axis.

$\langle -\sqrt{2}, \sqrt{2} \rangle$

6. _____

_____

7. Graph the polar curve given by $r = 1 + 2\cos 2\theta$ 7.

8. Suppose a polar graph is symmetric about the x-axis and contains the point $\left(4, \dfrac{\pi}{6}\right)$. Which of the following identify another point that must be on the graph?

I. $\left(4, \dfrac{-\pi}{6}\right)$ II. $\left(4, \dfrac{5\pi}{6}\right)$ III. $\left(-4, \dfrac{5\pi}{6}\right)$

(A) I only   (B) II only   (C) III only   (D) I and II   (E) I and III

8. _____

9. Replace the polar equation $r = \sec^2 \theta$ by an equivalent Cartesian equation.

9. _____

10. Find the slope of the polar curve $r = -2\cos 3\theta$ at $\theta = \dfrac{\pi}{6}$ and $\theta = \dfrac{\pi}{3}$. Confirm answers on your calculator.

10. $At \dfrac{\pi}{6}$ _____

$At \dfrac{\pi}{3}$ _____

11. Find the area of the region enclosed by $r = 5 - 2\cos\theta$

11. _____

12. Find the area of the region shared by the circle $r = 2$ and the cardioid $r = 2(1 - \cos\theta)$.

12. _____