

**Show all your work for full credit!!! You may receive 0 points even with the correct answer if there's no work. Since some answers may be found by using the calculator, I must see your steps that lead to your answer.**

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1. Use the exponential formula for hyperbolic functions to simplify the expressions.

a)  $\sinh(\ln t^2)$

b)  $\tanh(2 + \ln t)$

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2. Use the exponential formula for hyperbolic functions to show that the properties to evaluate each limit.

a)  $\lim_{x \rightarrow \infty} \frac{\cosh(2x)}{\sinh(3x)}$

b)  $\lim_{x \rightarrow \infty} \frac{e^{2x}}{\sinh(2x)}$

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3. Find the derivatives.

a)  $y = \sinh(2x)$

b)  $y = \cosh^2 t + \cosh(e^{t^2})$

c)  $y = \frac{\cosh t^3}{\sinh t}$

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4. Consider the function  $y = \sinh(2 - \sqrt{x})$  for  $x > 0$ .

a) Find the equation of the tangent line to the graph of  $y$  at  $x = 4$ .

b) Use the equation of the tangent line at  $x = 4$  to estimate  $y(4.1)$ .

c) Determine if the estimate  $y(4.1)$  is an overestimate or underestimate. Justify your answer.

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Starting with  $x_0 = 1$ , use TWO iterations of Newton's Method to determine an approximation the solution of the following equation.

7.  $x^2 + \ln x = 2$

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Use the Binomial Expansion Theorem to expand the expressions.

8.  $(3x - 4)^6$

Evaluate the limits algebraically. You may not use L'Hôpital's Rule.

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9.  $\lim_{x \rightarrow 0} \frac{x}{\sin 8x}$

10.  $\lim_{x \rightarrow 0} \frac{\cos^2 4x}{x^2 \cot^2 3x}$

9. 
$$\lim_{x \rightarrow 0} \frac{5x^2}{\cos 2x - 1}$$

10. 
$$\lim_{x \rightarrow 0} \frac{x^2}{\sec x - 1}$$

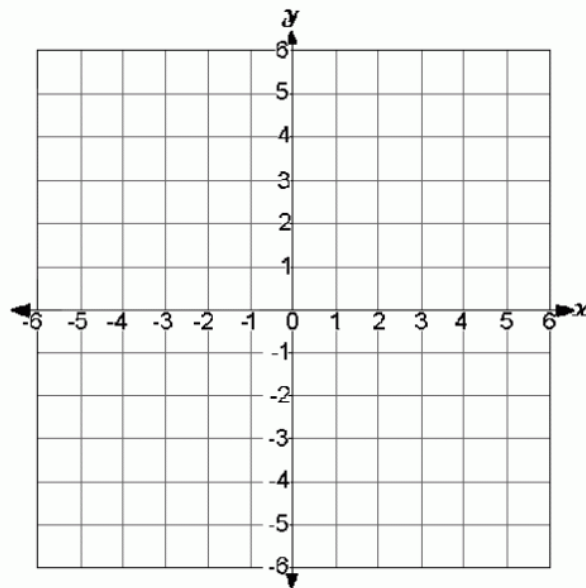
11. 
$$\lim_{x \rightarrow \frac{\pi}{3}} \frac{\frac{1}{2} - \cos x}{x - \frac{\pi}{3}}$$

[ Hint:  $\cos(a + b) = (\cos a)(\cos b) - (\sin a)(\sin b)$  ]

For each pair of parametric equations in problems #12 and #13, (a) fill in the table, (b) write the equation in terms of  $x$  and  $y$ , and (c) sketch the graph on the given interval.

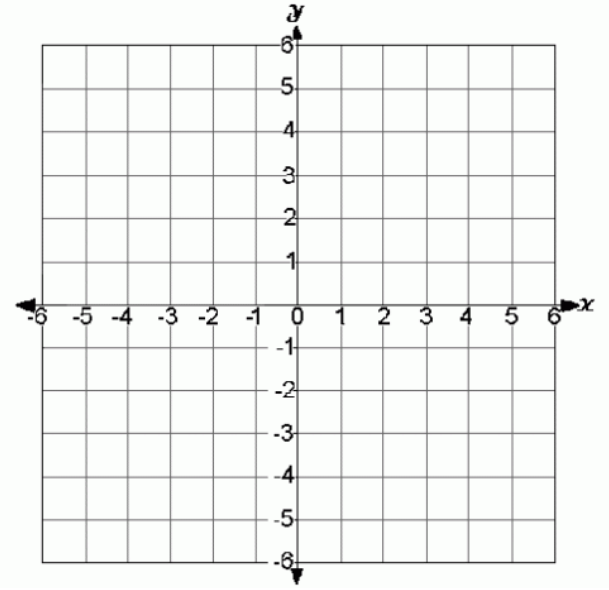
12.  $x(t) = 2t + 1$  and  $y(t) = t^2$  on  $-2 \leq t \leq 2$ .

$t$	$x$	$y$
-2		
-1		
0		
1		
2		

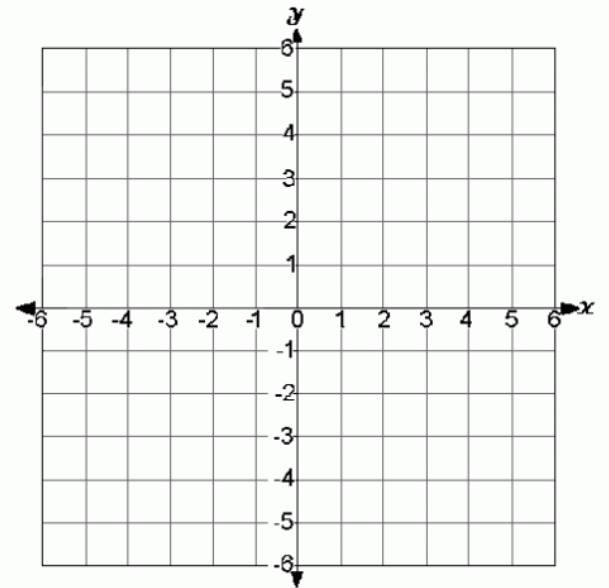
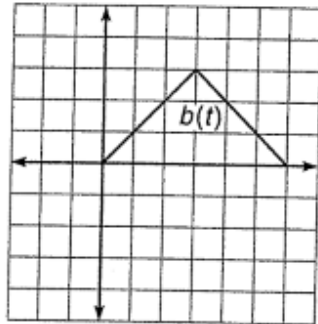
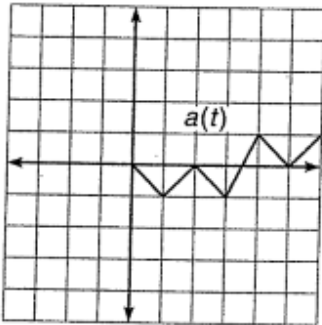


13.  $x(t) = 4 \cos t$  and  $y(t) = 4 \sin t$  on  $-\pi \leq t \leq \pi$ .

$t$	$x$	$y$
-2		
-1		
0		
1		
2		



14. Given the graphs below, draw the graph of the parametric equations  $x = a(t)$ ,  $y = b(t)$  on  $0 \leq t \leq 6$ .



15. Write parametric equations of a line passing through the points  $(3, -1)$  and  $(-2, -3)$ .

16. Write parametric equations of the circle  $x^2 + y^2 = 25$ .

17. Write parametric equations of the ellipse  $\frac{x^2}{81} + \frac{y^2}{100} = 1$ .

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

a.  $(-8, 15)$

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

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

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

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

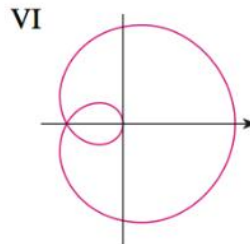
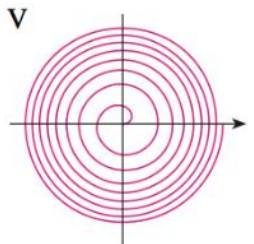
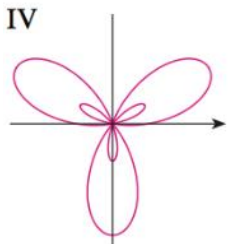
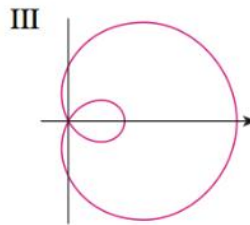
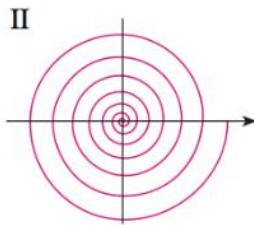
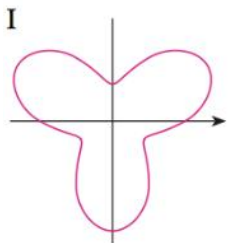
20. Match the polar equations with the graphs labeled I–VI. Give reasons for your choices. (Don't use a graphing device.)

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

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

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

JFF! Won't be on the test!!!



21. Write the rectangular equations in polar form.

a.  $y = 3x$

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

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22. Write the polar equations in rectangular form.

a.  $r = 2 \csc \theta$

b.  $r = -4 \sin \theta$