

First Name _____ Last Name _____

Lab 7

Find the domain of the vector-valued function.

1) $\mathbf{r}(t) = \sin 3t \mathbf{i} + e^{\sqrt{t}} \mathbf{j}$

A) $t > 3$

B) $t \geq \frac{1}{3}$

C) $-\infty < t < \infty$

D) $t \geq 0$

Find the domain of the vector-valued function.

2) $\mathbf{r}(t) = \ln(t-1)\mathbf{i} + \sqrt{4-t}\mathbf{j}$

A) $t \leq 4$

B) $t > 1$

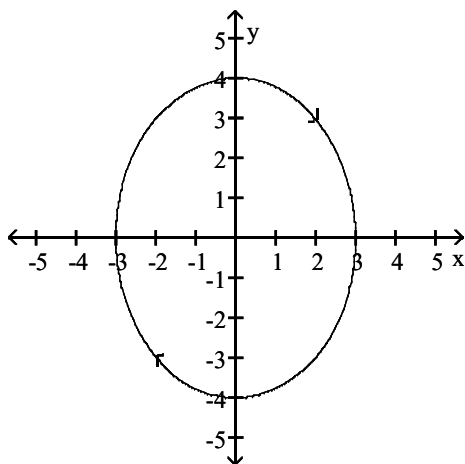
C) $1 < t < 4$

D) $1 < t \leq 4$

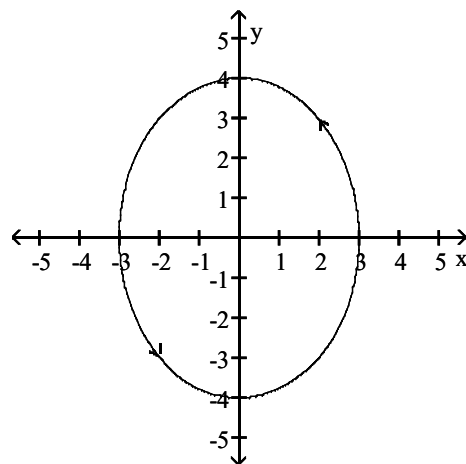
Graph the curve described by the function, indicating the positive orientation.

3) $\mathbf{r}(t) = \langle 3\cos t, 4\sin t \rangle$, for $0 \leq t \leq 2\pi$

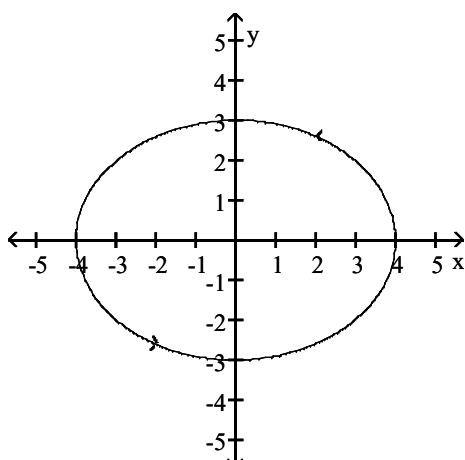
A)



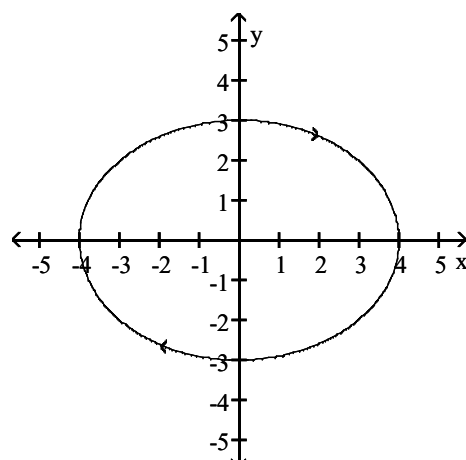
B)



C)



D)



Evaluate the limit.

4) $\lim_{t \rightarrow 7} [4ti - t^2j]$

A) $11i - 49j$

B) $28i - 7j$

C) $3i - 49j$

D) $28i - 49j$

5) $\lim_{t \rightarrow 6} \left[\frac{t-1}{t^2-1}i - \frac{t^2+2t-3}{t-1}j \right]$

A) $\frac{1}{7}i + 9j$

B) $\frac{1}{7}i - 9j$

C) $\frac{1}{5}i + 9j$

D) $\frac{1}{7}i - 3j$

6) $\lim_{t \rightarrow 3\pi/2} \langle 7 \cos t, 6 \sin t \rangle$

A) $7i$

B) $-6j$

C) $6j$

D) $7i - 6j$

7) $\lim_{t \rightarrow \ln 6} \langle 6e^{-t}, 3e^{-t} \rangle$

A) $\frac{1}{e}i - \frac{1}{2}j$

B) $i + \frac{1}{2}j$

C) $\frac{1}{2}j$

D) $-\frac{1}{2}j$

Differentiate the function.

8) $r(t) = (-7t^2 - 6)i + \left(\frac{1}{9}t^3\right)j$

A) $r'(t) = \left(\frac{1}{3}t^2\right)i + (-14t)j$

B) $r'(t) = (-14)i + \left(\frac{2}{3}t\right)j$

C) $r'(t) = (-14t)i + \left(\frac{1}{3}t^2\right)j$

D) $r'(t) = (-14t)i - \left(\frac{1}{3}t^2\right)j$

9) $r(t) = (\cot t)i + (\csc t)j$

A) $r'(t) = (-\csc^2 t)i - (\cot t \csc t)j$

B) $r'(t) = (\csc^2 t)i + (\cot t \csc t)j$

C) $r'(t) = (\sec^2 t)i + (\tan t \sec t)j$

D) $r'(t) = (-\sec^2 t)i - (\tan t \sec t)j$

10) $r(t) = (4e^{t^2})i - (3t)j + t^2k$

A) $r'(t) = (8te^{t^2})i - 3j + 2tk$

B) $r'(t) = (8te^{t^2})i - 3j + 2tk$

C) $r'(t) = (8te^{t^2})i + 2tk$

D) $r'(t) = (8e^{t^2})i - 3j + 2tk$

Compute $\mathbf{r}''(t)$.

11) $\mathbf{r}(t) = (3 \ln(6t))\mathbf{i} + (2t^3)\mathbf{j}$

A) $\mathbf{r}''(t) = \frac{3}{t}\mathbf{i} + 6t\mathbf{j}$

B) $\mathbf{r}''(t) = \frac{3}{t^2}t^{-2}\mathbf{i} + 12t\mathbf{j}$

C) $\mathbf{r}''(t) = -\frac{3}{t^2}\mathbf{i} + 12t\mathbf{j}$

D) $\mathbf{r}''(t) = -\frac{1}{2}t^{-2}\mathbf{i} + 12t\mathbf{j}$

Find the unit tangent vector of the given curve.

12) $\mathbf{r}(t) = 3t^5\mathbf{i} - 12t^5\mathbf{j} + 4t^5\mathbf{k}$

A) $\mathbf{T} = \frac{3}{169}\mathbf{i} - \frac{12}{169}\mathbf{j} + \frac{4}{169}\mathbf{k}$

B) $\mathbf{T} = \frac{3}{13}\mathbf{i} - \frac{12}{13}\mathbf{j} + \frac{4}{13}\mathbf{k}$

C) $\mathbf{T} = \frac{3}{13}\mathbf{i} - \frac{12}{13}\mathbf{j} - \frac{4}{13}\mathbf{k}$

D) $\mathbf{T} = \frac{3}{13}\mathbf{i} + \frac{12}{13}\mathbf{j} + \frac{4}{13}\mathbf{k}$

13) $\mathbf{r}(t) = (6 \sin^3 2t)\mathbf{i} + (6 \cos^3 2t)\mathbf{j}$

A) $\mathbf{T} = (6 \cos 2t)\mathbf{i} - (6 \sin 2t)\mathbf{j}$

B) $\mathbf{T} = (\sin 2t)\mathbf{i} - (\cos 2t)\mathbf{j}$

C) $\mathbf{T} = (36 \sin 2t)\mathbf{i} - (36 \cos 2t)\mathbf{j}$

D) $\mathbf{T} = (6 \sin 2t)\mathbf{i} - (6 \cos 2t)\mathbf{j}$

Solve the initial value problem.

14) Differential Equation: $\frac{d\mathbf{r}}{dt} = (t^4 + 5t^2)\mathbf{i} + 4t\mathbf{j}$ Initial Condition: $\mathbf{r}(0) = 5\mathbf{i} - 6\mathbf{j}$

A) $\mathbf{r}(t) = \left(\frac{t^5}{5} + \frac{5t^3}{3} + 5 \right)\mathbf{i} + (t^2 - 6)\mathbf{j}$

B) $\mathbf{r}(t) = \left(\frac{t^5}{5} + \frac{5t^3}{3} - 6 \right)\mathbf{i} + (2t^2 + 5)\mathbf{j}$

C) $\mathbf{r}(t) = \left(\frac{t^5}{5} + \frac{5t^3}{3} + 5 \right)\mathbf{i} + (2t^2 - 6)\mathbf{j}$

D) $\mathbf{r}(t) = \left(\frac{t^5}{5} + \frac{5t^3}{3} \right)\mathbf{i} + 2t^2\mathbf{j}$

Evaluate the integral.

15) $\int_0^3 \left[\left(\frac{2}{\sqrt{1+t}} \right)\mathbf{i} - (9t^2)\mathbf{j} + \left(\frac{6t}{(1+t^2)^2} \right)\mathbf{k} \right] dt$

A) $4\mathbf{i} - 81\mathbf{j} + \frac{9}{10}\mathbf{k}$

B) $2\mathbf{i} - 81\mathbf{j} + \frac{27}{10}\mathbf{k}$

C) $4\mathbf{i} - 81\mathbf{j} + \frac{27}{10}\mathbf{k}$

D) $4\mathbf{i} + 81\mathbf{j} + \frac{9}{10}\mathbf{k}$

16) $\int_0^1 \left[(24t^2 - 3)\mathbf{i} + \frac{8t}{t^2 + 1}\mathbf{j} - \frac{t}{\sqrt{t^2 + 1}}\mathbf{k} \right] dt$

A) $5\mathbf{i} + 4 \ln 2\mathbf{j} + (1 - \sqrt{2})\mathbf{k}$

B) $11\mathbf{i} + 4 \ln 2\mathbf{j} + (1 + \sqrt{2})\mathbf{k}$

C) $11\mathbf{i} + 4 \ln 2\mathbf{j} + \frac{1 - \sqrt{2}}{2}\mathbf{k}$

D) $11\mathbf{i} + 4 \ln 2\mathbf{j} + (1 - \sqrt{2})\mathbf{k}$

Answer Key

Testname:

- 1) D
- 2) D
- 3) B
- 4) D
- 5) B
- 6) B
- 7) B
- 8) C
- 9) A
- 10) B
- 11) C
- 12) B
- 13) B
- 14) C
- 15) C
- 16) A