Precalculus
Final Exam

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This exam is comprehensive over the entire course and includes 12 questions. You have 60 minutes to complete the exam.

The exam is worth 100 points. The 8 multiple choice questions are worth 5 points each (40 points total) and the 4 free response questions are worth 15 points each (60 points total).

Mark your multiple choice answers on this cover page. For the free response questions, show your work and make sure to circle your final answer.

1. (5 pts)   A   B   C   D   E

2. (5 pts)   A   B   C   D   E

3. (5 pts)   A   B   C   D   E

4. (5 pts)   A   B   C   D   E

5. (5 pts)   A   B   C   D   E

6. (5 pts)   A   B   C   D   E

7. (5 pts)   A   B   C   D   E

8. (5 pts)   A   B   C   D   E

1. **(5 pts)** Convert $x^2 + 4y^2 = 1$ into polar coordinates.

A $\quad r = \dfrac{1}{1 + 3 \sin \theta}$ 　 C $\quad r^2 = \dfrac{1}{1 + 3 \sin \theta}$ 　 E $\quad r = \dfrac{1}{4 + 3 \cos \theta}$

B $\quad r = \dfrac{1}{1 + 3 \sin^2 \theta}$ 　 D $\quad r^2 = \dfrac{1}{1 + 3 \sin^2 \theta}$

2. **(5 pts)** Find the absolute value of $z = -4 + 3i$.

A $\quad 7$ 　 C $\quad 1$ 　 E $\quad 25$

B $\quad 5$ 　 D $\quad -1$

3. **(5 pts)** Given $z = 2 + i$, find $(z - 3)^5$.

A $4(1 - i)$

B $\sqrt{32}(i - 1)$

C $4(-1 + i)$

D $\sqrt{32}(1 - i)$

E $\dfrac{1}{\sqrt{2}}(1 - i)$

4. **(5 pts)** Find the inverse of A.

$$A = \begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix}$$

A $\begin{bmatrix} 5 & \frac{1}{3} \\ \frac{1}{3} & 2 \end{bmatrix}$

B $\dfrac{1}{19}\begin{bmatrix} 5 & \frac{1}{3} \\ \frac{1}{3} & 2 \end{bmatrix}$

C $\begin{bmatrix} 5 & -3 \\ -3 & 2 \end{bmatrix}$

D $\dfrac{1}{19}\begin{bmatrix} 5 & -3 \\ -3 & 2 \end{bmatrix}$

E $\begin{bmatrix} -2 & -3 \\ -3 & -5 \end{bmatrix}$

5. **(5 pts)** Find AB.

$$A = \begin{bmatrix} 1 & 0 & 2 \\ -1 & 1 & 0 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & 0 \\ 1 & 0 \\ 0 & -1 \end{bmatrix}$$

A $\quad \begin{bmatrix} 2 & -2 \\ -1 & 0 \end{bmatrix}$

C $\quad \begin{bmatrix} -2 & 2 \\ 0 & -1 \end{bmatrix}$

E $\quad \begin{bmatrix} 2 & 1 & 1 \\ 0 & 0 & -1 \\ 4 & 2 & 0 \end{bmatrix}$

B $\quad \begin{bmatrix} -1 & 0 \\ 2 & -2 \end{bmatrix}$

D $\quad \begin{bmatrix} 2 & 0 & 4 \\ 1 & 0 & 2 \\ 1 & -1 & 0 \end{bmatrix}$

6. **(5 pts)** Find the partial fractions decomposition of the function.

$$f(x) = \frac{6 - 4x}{x(x-1)(x-2)}$$

A $\quad f(x) = -\dfrac{1}{x} - \dfrac{2}{x-1} + \dfrac{3}{x-2}$

D $\quad f(x) = -\dfrac{3}{x} + \dfrac{2}{x-1} + \dfrac{1}{x-2}$

B $\quad f(x) = \dfrac{1}{x} + \dfrac{2}{x-1} + \dfrac{3}{x-2}$

E $\quad f(x) = \dfrac{3}{x} - \dfrac{2}{x-1} - \dfrac{1}{x-2}$

C $\quad f(x) = \dfrac{3}{x} + \dfrac{2}{x-1} + \dfrac{1}{x-2}$

7. **(5 pts)** Determine the shape of the curve.

$$x^2 - 3xy + 2y^2 + 4x - 2y + 3 = 0$$

A	Circle	C	Parabola	E	Lemniscate
B	Ellipse	D	Hyperbola		

8. **(5 pts)** Find the equivalent rectangular equation by eliminating the parameter.

$$x = 4\cos^2 t \text{ and } y = 9\sin^2 t$$

A $\quad \dfrac{x^2}{4} + \dfrac{y^2}{9} = 1$ $\qquad\qquad$ D $\quad y = -\dfrac{9}{4}x + 9$

B $\quad \dfrac{x^2}{2} + \dfrac{y^2}{3} = 1$ $\qquad\qquad$ E $\quad y = -\dfrac{3}{2}x + 3$

C $\quad 4x^2 + 9y^2 = 1$

9. **(15 pts)** Find points of intersection of the polar curves.

$$r = 2 \cos \theta$$

$$r = 1$$

10. **(15 pts)** Find the partial fractions decomposition of the function.

$$f(x) = \frac{x^2 + x + 2}{x(x + 1)^2}$$

11. **(15 pts)** Find the directrices of ellipse $4x^2 + y^2 - 16x + 2y + 16 = 0$.

12. **(15 pts)** Sketch the graph of the parametric curve for $t \in [0,\pi]$.

$x = \cos^2 t$

$y = \sin t \cos t$