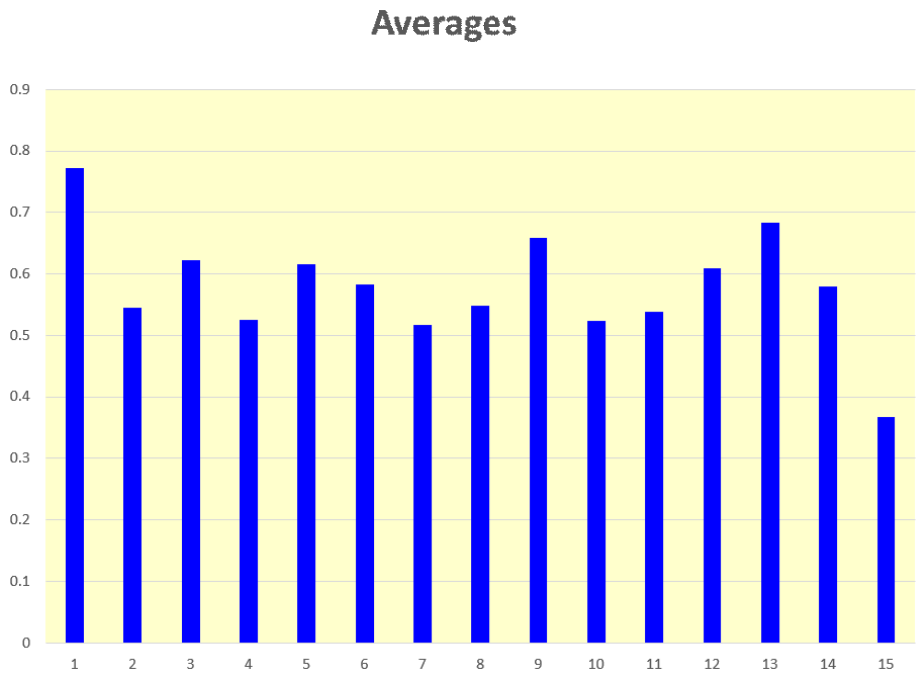
King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 201
Exam 1
252
17 February 2026
Net Time Allowed: 90 Minutes

MASTER VERSION

			Raw Score	% Score
Total no. of Students:	451	**Course Mean:**	43.45	57.93
Course Std. Dev. :	16.77	**Max. Score:**	75	100
		Min. Score:	5	6.67



1. The parametric curve

$$x = t - 6, \quad y = t^2$$

(a) is concave upward for all values of $t \in (-\infty, \infty)$. _____(correct)

(b) is concave downward for all values of $t \in (0, \infty)$.

(c) is concave upward only for $t > 0$ and concave downward for $t < 0$.

(d) has a slope 2 when $t = -1$.

(e) has a horizontal tangent at $t = 1$.

2. The graph of the parametric curve

$$x = \frac{4}{\cos t}, \quad y = \frac{3 \sin t}{\cos t} \quad \text{is}$$

(a) a hyperbola _____(correct)

(b) a line

(c) an ellipse

(d) a circle

(e) a parabola

3. The **vector component** of $\vec{u} = \langle -9, -2, -4 \rangle$ **orthogonal** to $\vec{v} = \langle 0, 4, 4 \rangle$ is

(a) $\vec{u} + \frac{3}{4}\vec{v}$ (correct)

(b) $\vec{u} - \frac{3}{4}\vec{v}$

(c) $\frac{3}{4}\vec{v}$

(d) $-\frac{3}{4}\vec{v}$

(e) $\vec{u} - \frac{4}{3}\vec{v}$

4. If the **area** of the surface generated by revolving the parametric curve

$$x = \frac{t^3}{3}, \quad y = t + 1, \quad 1 \leq t \leq 2,$$

about the y-axis, is equal to $\frac{\pi}{9}\left(a^{\frac{3}{2}} - b^{\frac{3}{2}}\right)$, then $a + b =$

(a) 19 (correct)

(b) 15

(c) 17

(d) 18

(e) 16

5. The **slope** of the tangent line to the polar curve

$$r = 2(1 - \cos\theta)$$

at the point corresponding to $\theta = \dfrac{4\pi}{3}$ is equal to

(a) 0 _____(correct)

(b) $\sqrt{2}$

(c) $\dfrac{\sqrt{3}}{2}$

(d) $\dfrac{1}{2\sqrt{3}}$

(e) $\dfrac{1}{\sqrt{3}}$

6. The polar equation $r^2 = 4\sec\theta\csc\theta$ can be converted to the rectangular equation

(a) $y = \dfrac{4}{x}$ _____(correct)

(b) $y = 4x$

(c) $y = 2x$

(d) $y = \dfrac{2}{x}$

(e) $y = \dfrac{x}{2}$

7. The **graph** of $(x^2+y^2)^3 = 4x^2y^2$ is

(a) a four-petal rose (correct)
(b) a cardioid
(c) a circle
(d) a limacon with an inner loop
(e) a lemniscate

8. The **area** of the region enclosed by the cardioid $r = 2(1+\cos\theta)$ is equal to

(a) 6π (correct)
(b) 2π
(c) 12π
(d) 3π
(e) 4π

9. The **product** of all possible values of α such that the points

$$P(0,2,1),\ Q(\alpha-1,0,\alpha),\ R(5,-\alpha,6)$$

are **collinear**, is equal to

(a) -12 (correct)
(b) -1
(c) 1
(d) 12
(e) 7

10. Let α be the angle between the two nonzero vectors $\vec{u}$ and $\vec{v}$. If

$$\vec{u}\cdot\vec{v}=-1 \quad \text{and} \quad ||\vec{u}\times\vec{v}||=\frac{1}{\sqrt{3}}, \text{ then } \sec(\alpha)=$$

(a) $-\dfrac{2}{\sqrt{3}}$ (correct)
(b) -2
(c) $\dfrac{2}{\sqrt{3}}$
(d) $-\sqrt{3}$
(e) $\sqrt{3}$

11. The **area** of the region inside the circle $r = 1$ and outside of the cardioid $r = 1 - \cos\theta$ is equal to

(a) $2 - \frac{\pi}{4}$ (correct)
(b) $1 - \frac{\pi}{8}$
(c) $4 - \frac{\pi}{2}$
(d) $2 + \frac{\pi}{4}$
(e) $1 - \frac{\pi}{4}$

12. If the standard equation of the sphere with center $(-4, 5, 6)$ and tangent to the yz-plane is $(x-a)^2 + (y-b)^2 + (z-c)^2 = r^2$, then $a + b + c + r^2 =$

(a) 23 (correct)
(b) 31
(c) 32
(d) 43
(e) 11

13. The triangle with the vertices

$$P(1,2,0),\ Q(0,0,0),\ R(-2,1,0)$$

(a) is a right triangle _____(correct)
(b) is an obtuse triangle
(c) is an acute triangle
(d) has an area of 5
(e) has an area of 10

14. **The value** of c for which the three vectors

$$\vec{u} =< 1, c, -7 >, \quad \vec{v} =< 2, -1, c >, \quad \vec{w} =< 0, -9, 18 >$$

are **coplanar** (lie in the same plane) is

(a) 4 _____(correct)
(b) $\frac{1}{4}$
(c) $-\frac{2}{3}$
(d) $-\frac{12}{5}$
(e) $\frac{27}{7}$

15. If the angle between the two unit vectors $\vec{A}$ and $\vec{B}$ is 120°, then $||\vec{B} - \vec{A}|| =$

(a) $\sqrt{3}$ _____(correct)

(b) $\sqrt{2}$

(c) 2

(d) 1

(e) 3