

Math 240 - Key to Review for Exam 1

1. (a) z-axis

(b) The half-circle $y^2 + z^2 = 1, y \geq 0$.

2. Find $b \times c$. Answer: $4i - 4j$

3. (a) Any value of (x,y) satisfying $11x+9y+2=0$ is OK (b) $x = -2, y = 8$

4. 0

5. (a) $y = -z + 1$; Plane (b) $x^2 + 4y^2 + z^2 = 4$; Ellipsoid

(c) $y^2 - \frac{1}{9}z^2 = 1$; Hyperbolic Cylinder (d) $z = \sqrt{9 - x^2 - y^2}$: Upper half sphere of radius 3

(e) $z = x^2 + y^2$; Paraboloid (f) $z = \sqrt{x^2 + y^2}$; Cone

(g) A solid under an upper semi sphere centered at (0,0,0) and radius 1, including its interior

6. (a) $\text{comp}_a b = \frac{-1}{\sqrt{6}}$ (b) $\text{proj}_a b = \frac{-1}{6}(i + j - 2k)$ (c) $\cos^{-1}(\frac{-1}{\sqrt{84}}) \approx 96.3^\circ$

(d) $a \cdot (b \times c) = 18$ (e) $\frac{-1}{\sqrt{14}}$ (f) $\frac{-1}{14}\langle 3, -2, 1 \rangle$

7. (a) $\frac{x-4}{3} = \frac{y+1}{2} = \frac{z-2}{1}$ (b) $-4x + 3y + z + 14 = 0$ (c) $x = \frac{y-5}{-2} = z + 1$

8. $\|D\| = \sqrt{70}$

9.

Rectangular	Cylindrical	Spherical
(0,1,1)	$(1, \pi/2, 1)$	$(\sqrt{2}, \pi/2, \pi/4)$
$(0, -1.5, \sqrt{3}/2)$	$(1.5, 3\pi/2, \sqrt{3}/2)$	$(\sqrt{3}, 3\pi/2, \pi/3)$
$(1, \sqrt{3}, -1)$	$(2, \pi/3, -1)$	$(\sqrt{5}, \pi/3, 116^\circ)$

10. A line $(2, \pi/4, z)$ for any z in cylindrical coordinate or $(\sqrt{2}, \sqrt{2}, z)$ in rectangular coordinates

11. (a) (2,1,8) (b) $\frac{3}{\sqrt{15}}$ (c) $\frac{9}{5}\langle 0, 1, 2 \rangle$ (d) $\sqrt{216}$ (e) $7x + 2y - z = 8$