EX 9.7.5: Identify & characterize quadric surface: $7y^2 - \frac{9}{16}x^2 - \frac{63}{16} = 0$

1^{st}, **collect & isolate all squared-variable terms**: $7y^2 - \frac{9}{16}x^2 = \frac{63}{16}$

2^{nd}, manipulate equation until a **canonical form** is produced: $7y^2 - \frac{9}{16}x^2 = \frac{63}{16} \implies \frac{16}{9}y^2 - \frac{1}{7}x^2 = 1 \implies \frac{y^2}{9/16} - \frac{x^2}{7} = 1$

3^{rd}, use the heuristic presented in the 9.7 Slides to help identify quadric surface:

Missing variable (z) $\overset{THINK}{\implies}$ "cylinder"
Exactly one negative squared-variable term $\overset{THINK}{\implies}$ "hyperbolic/hyperboloid of one sheet"'

4^{th}, combine these phrases in the only meaningful way:

Hyperbolic Cylinder
Axis of Generation: z-axis (Missing Variable)

EX 9.7.6: Identify & characterize quadric surface: $3y^2 + 25z^2 - 75 = 0$

1^{st}, **collect & isolate all squared-variable terms**: $3y^2 + 25z^2 = 75$

2^{nd}, manipulate equation until a **canonical form** is produced: $3y^2 + 25z^2 = 75 \implies \frac{y^2}{25} + \frac{z^2}{3} = 1$

3^{rd}, use the heuristic presented in the 9.7 Slides to help identify quadric surface:

Missing variable (x) $\overset{THINK}{\implies}$ "cylinder"
All squared-variable terms are positive $\overset{THINK}{\implies}$ "elliptic/ellipsoid"'

4^{th}, combine these phrases in the only meaningful way:

Elliptic Cylinder
Axis of Generation: x-axis (Missing Variable)

EX 9.7.9: Identify & characterize quadric surface: $\pi^{8/5}x^2 - \pi^3 z^2 - \pi^{23/5}y = 0$

1^{st}, **collect & isolate all squared-variable terms**: $\pi^{23/5}y = \pi^{8/5}x^2 - \pi^3 z^2$

2^{nd}, manipulate equation until a **canonical form** is produced: $\pi^{23/5}y = \pi^{8/5}x^2 - \pi^3 z^2 \implies y = \frac{x^2}{\pi^3} - \frac{z^2}{\pi^{8/5}}$

3^{rd}, use the heuristic presented in the 9.7 Slides to help identify quadric surface:

Exactly one linear variable (y) $\overset{THINK}{\implies}$ "parabolic/paraboloid"
Exactly one negative squared-variable term $\overset{THINK}{\implies}$ "hyperbolic/hyperboloid of one sheet"

4^{th}, combine these phrases in the only meaningful way:

Hyperbolic Paraboloid
(nothing to characterize)

EX 9.7.10: Identify & characterize quadric surface: $\frac{\sqrt[3]{10}}{5}x^2 - \left(\sqrt[3]{10}\right)Qy^2 - \frac{Q}{5}z^2 - \frac{\sqrt[3]{10}}{5}Q = 0$, where $Q > 0$

1^{st}, **collect & isolate all squared-variable terms**: $\frac{\sqrt[3]{10}}{5}x^2 - \left(\sqrt[3]{10}\right)Qy^2 - \frac{Q}{5}z^2 = \frac{\sqrt[3]{10}}{5}Q$

2^{nd}, manipulate equation until a **canonical form** is produced: $\frac{x^2}{Q} - \frac{y^2}{1/5} - \frac{z^2}{\sqrt[3]{10}} = 1$

3^{rd}, use the heuristic presented in the 9.7 Slides to help identify quadric surface:

Exactly two negative squared-variable terms $\overset{THINK}{\implies}$ "hyperboloid of two sheets"

4^{th}, combine these phrases in the only meaningful way:

Hyperboloid of Two Sheets
Axis of Revolution: x-axis (Positive Squared-Variable Term)

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