Outline: The highlighted part means: the idea of the question (type of question)

The information below is some examples – not necessarily all

1. Intercepts – of any curve we looked at
   find the x and y – intercepts of a given curve;
   \( y = \frac{x^2 - 2x - 15}{x + 2} \)

   \( y = \log_4 x \)

   \( y^2 = \frac{x^2 - 9}{x^2 - 4} \)

   \( y = \cosh x \)

2. Asymptotes
   Find the vertical, horizontal, and slant asymptote – if it does not exist, then state so ( or if other than a line, then write down the curve)

   \( y = 4^x \)

   \( y = \frac{x + 1}{x^2 - 4} \)

   \( y = \frac{x + 1}{x^2 - 1} \)

   ** xy – y – x^2 + 2x + 4 = 0

3. Sketch the graph of each of the following curves
   (especially algebraic, exponential, logarithmic, and polar)

   \( y = \frac{e^x - e^{-x}}{2} \)

   \( y = \frac{x(2x + 1)}{(x - 1)(x + 2)} \)

   \( y = \log_3 x \)

   \( x + y - x + 3 = 0 \) or like the one above **

4. Sketch Other curves

   \( r \cos \theta = 2 \) in polar coordinates

   \( r = 2 \)

   \( r = -2 \)

   \( r \sin \theta = 1 \)
5. Sketch the graph of these - any of those we worked with (since last exam)

\[ y = \sin x \quad y = 2 \cos x \quad y = \tan x \]

6. Find the domain and the range of

a) \[ y = \log_2 (x + 2) \]

b) \[ y = \cosh x \]

c) \[ y = \frac{e^x - e^{-x}}{2} \]

d) \[ y = \frac{4}{x^2 - 4x} \] (just the domain)

e) what is the range of \[ y = 2 \cos x \]

7. Prove identities of hyperbolic trig. functions

a) define \( \sinh x = \ldots \) \( \cosh x = \ldots \) and \( \tanh x = \ldots \)

b) prove: (identities or just algebraic expressions using the definitions above)

\[ \cosh^2 x - \sinh^2 x = ? \]

others: similar to the ones from trig.

8. Problems with exponential and logarithmic functions

Find the value of \( x \) so that \( 43^x = 267 \) →

exact solution: \ldots \ approximate (to the nearest hundredth): \ldots

Others:
9. Find the value of x in each of the following problems

a) \( 8^x = \frac{1}{2} \rightarrow x = \) \[ \log_4 16 = x \rightarrow x = \] 

b) \( 4^{\log_2 8} = x \), \( x = \) \[ \log_3 3^{12} = x \rightarrow x = \] 

c) \( 4^{\log_2 8} = x \), \( x = \)
d) \( \log_3 3^{12} = x \rightarrow x = \)

10. Plot the points on a polar coordinate system \( P(-3, 40^\circ), Q(2, -\pi/4), T(-4, \pi/2) \)

12. Find other representations of \( P(r, \theta) \) with \(|\theta| < 2\pi \) (or even \( 360^\circ \)) in polar coordinates

a) \((2, 40^\circ)\): answers should be in degrees

b) \((-3, \pi/3)\): answers should be in radians

13. Convert from polar to rectangular coordinates

a) \((-4, 135^\circ) \rightarrow \) \[ \] 
b) \((4, -\pi) \rightarrow \)

14. Convert from rectangular to polar coordinates

\((-3, 3) \rightarrow \) \[ \] 
\((0, -4) \rightarrow \) \[ \] 
\((2, -2\sqrt{3}) \rightarrow \)

15. Convert to radians

a) \(315^\circ \rightarrow \) \[ \] 
b) \(-720^\circ \rightarrow \) \[ \] 
c) \(118^\circ = \) \[ \] 

16. Convert to degrees

a) \(2\pi/15 \text{ radians} \rightarrow \) \[ \] 
\(-3\pi/2 \text{ radians} = \) \[ \]
17. Write down all four formulas that can be used to change from polar to rectangular and from rectangular to polar.

18. What do each of the following polar equations represent?
   a) $r \cos \theta = -2$
   b) $r = 5$
   c) $r = 2 \sin \frac{\pi}{3}$

19. If $y = x + 3$ is the slant asymptote of the function $f(x) = \frac{x^2 + 3x + 5}{x}$ show whether $f(x)$ crosses the slant asymptote.

20. IF $f(x) = \frac{(2x-3)(x+1)}{(x-1)(x+2)}$ find the horizontal asymptote and determine if $f(x)$ crosses it or not.

21. Identify each of the following as even, odd, or neither:
   a) $f(x) = xy$
   b) $g(x) = \cosh x$
   c) $h(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}$
   d) $y = \frac{x^2}{x^2 + 4}$

22. Find the inverse function of:
   a) $f(x) = 2^x \rightarrow g(x) = \ldots$
   b) $f(x) = 2x - 1 \rightarrow g(x) = \ldots$