MAC 1147 - Quiz 5 **Name:**

For full credit, you must <u>show all work</u> and <u>circle</u> your final answer.

1 Use Polynomial division to find $\frac{f(x)}{g((x)}$. Is $g(x)$ a factor of $f(x)$?
$f(x) = x^3 + 3x^2 - x - 3$ and $g(x) = x + 1$

$$\begin{array}{r|l}
 & x^2 + 2x - 3 \\
\hline
x+1 & x^3 + 3x^2 - x - 3 \\
 & -x^3 - x^2 \\
\hline
 & 2x^2 - x \\
 & -2x^2 - 2x \\
\hline
 & -3x - 3 \\
 & 3x + 3 \\
\hline
 & 0
\end{array}$$

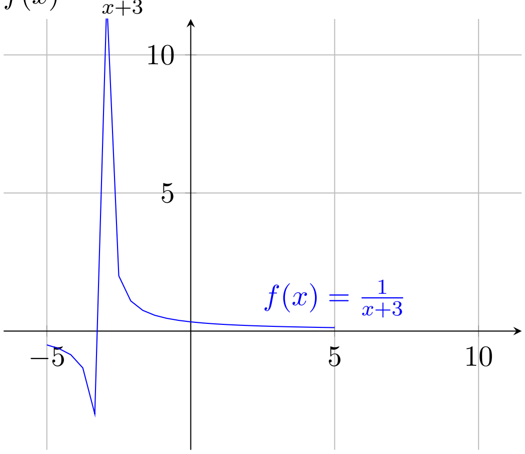
As there is no remainder, $g(x)$ is a factor of $f(x)$. In fact this tells us $f(x) = g(x)(x^2 + 2x - 3)$. You can also find this by using Synthetic Division:

$$\begin{array}{r|rrrr}
 & 1 & 3 & -1 & -3 \\
-1 & & -1 & -2 & 3 \\
\hline
 & 1 & 2 & -3 & 0
\end{array}$$

2 For the complex numbers x, y compute $x + y$, $x - y$, $x * y$:
$x = 2 + i$ and $y = 3 + 4i$

$x + y = (2 + i) + (3 + 4i) = (2 + 3) + (1 + 4)i = 5 + 5i$
$x - y = (2 + i) - (3 + 4i) = (2 - 3) + (1 - 4)i = -1 - 3i$
$x * y = (2 + i)(3 + 4i) = 6 + 8i + 3i + 4(i^2) = 2 + 11i$

3 Find the vertical asymtope of $f(x)$, and sketch the graph. (Don't forget about the y-intercept!)
$f(x) = \frac{1}{x+3}$



The picture here is not completely accurate, there is an asymtope at $x = -3$, but this is as close as I could get it in LaTex.
There is a vertical asymtope at $x = -3$, since $f(-3) = \frac{1}{-3+3} = \frac{1}{0}$, which is undefined.
Also, $f(0) = \frac{1}{0+3} = \frac{1}{3}$ so the y intercept is $\frac{1}{3}$