13. (10pts) Given that x^2+4 is a factor, factor the polynomial $x^4-3x^3+6x^2-12x+8$ completely, using complex coefficients if necessary.

$$\begin{array}{r|l} & x^2-3x+2 \\ \hline x^2+4 & x^4-3x^3+6x^2-12x+8 \\ & x^4 \quad\quad +4x^2 \\ \hline & -3x^3+2x^2-12x+8 \\ & -3x^3 \quad\quad -12x \\ \hline & 2x^2 \quad +8 \\ & 2x^2 \quad +8 \\ \hline & 0 \end{array}$$

$(x^2+4)(x^2-3x+2)$

$(x+2i)(x-2i)(x-1)(x-2)$

14. (10pts) For the quadratic function $f(x)=2x^2+8x+7$

(a) determine the vertex of the parabola defined by the function $f(x)$;

Vertex at $x=\frac{-b}{2a}=\frac{-8}{2\cdot2}=-2$

$f(-2)=2(-2)^2+8(-2)+7=-1$

$(-2,-1)$

(b) determine all x-intercepts (with exact values) of the graph of $f(x)$.

$2x^2+8x+7=0$

$x=\frac{-8\pm\sqrt{8^2-4\cdot2\cdot7}}{2\cdot2}=\frac{-8\pm\sqrt{8}}{4}=-\frac{4\pm\sqrt{2}}{2}$

$(\frac{-4+\sqrt{2}}{2},0)$

$(\frac{-4-\sqrt{2}}{2},0)$

15. (10pts) Completely expand the logarithm as sum, difference, and/or constant multiples of simple logarithms ($x>1$).

$\ln\sqrt{x^3(x^2-1)}=$ $\ln\left(x^3(x^2-1)\right)^{1/2}$

$=\frac{1}{2}\ln(x^3(x^2-1))=\frac{1}{2}\ln x^3+\frac{1}{2}\ln(x^2-1)$

$=\frac{3}{2}\ln x+\frac{1}{2}\ln(x+1)+\frac{1}{2}\ln(x-1)$

16. (10pts) Solve the equation $e^{2x}-6e^x+5=0$ for x.

$(e^x)^2-6(e^x)+5=0$

$(e^x-5)(e^x-1)=0$

$e^x=5$ or $e^x=1$

$x=\ln 5$ or $x=\ln 1=0$

pg score