1) (2 points) What does it mean to factor?

Professor Glaesner left her coffee in my office.

2) (3 points each) Find the GCF of the following:

a) $p^3q^4,\ p^2q^4,\ p^8q^3$

p^2q^3

b) $25x^2, 125x^4y, 50x^3y^2$

$25x^2$

3) (3 points each) Factor out the GCF from the following:

a) $16x^2-18x^3+20x$

$2x(8x-9x^2+10)$

b) $70x^5y^3-20x^4y^3+30x^3y^3$

$10x^3y^3(7x^2-2x+3)$

4) (3 points each) Factor completely:

a) x^2+x-12

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

b) x^2-x-56

$(x-8)(x+7)$

c) $14x(2x+5)-5(2x+5)$

$(2x+5)(14x-5)$

d) x^3-3x^2+x-3

$x^2(x-3)+1(x-3)$

$(x-3)(x^2+1)$

e) $6x^2+2xy+21x+7y$

$2x(3x+y)+7(3x+y)$

$(3x+y)(2x+7)$

f) $-x^2+x+20$

$-(x^2-x-20)$

$-(x-5)(x+4)$

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5) (4 points each) More factoring completely. Woo!

a) $3x^4 - 3x^3 - 60x^2$

$3x^2(x^2 - x - 20)$

$3x^2(x-5)(x+4)$

b) $-2p^2q^2 - 4pq^2 - 2q^2$

$-2q^2(p^2 + 2p + 1)$

$-2q^2(p+1)^2$

c) $3xy^2 - 48x$

$3x(y^2 - 16)$

$3x(y+4)(y-4)$

d) $8 - x^3$

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

e) $x^4 - 16$

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

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

f) $x^5 - 4x^3 - 8x^2 + 32$

$x^3(x^2-4) - 8(x^2-4)$

$(x^2-4)(x^3-8)$

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

g) $x^4 - 20x^2 + 64$

$(x^2-16)(x^2-4)$

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

h) $16x^3 - 16x^2 - 12x$

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

$4x(2x-3)(2x+1)$

6) (1 point each) Match the factored form to the expanded form:

C	$(a+b)^2$	A: $a^2 + 2ab + b^2$
a	$(a-b)^2$	B: $a^3 + b^3$
f	$(a+b)(a-b)$	C: $a^2 - 2ab + b^2$
f	$(a+b)(a^2 - ab + b^2)$	D: $a^2 - b^2$
è	$(a-b)(a^2 + ab + b^2)$	E: $a^3 - b^3$

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7) (4 points part *a*, 5 points parts *b* – *d*) Solve the following equations for the variable:

a) $(3x-4)(x+2)=0$

$3x-4=0$ $\quad x+2=0$

$x=\frac{4}{3}$ $\quad x=-2$

b) $x^2+5x+6=0$

$(x+2)(x+3)=0$

$x=-2 \quad x=-3$

c) $4x^3-12x^2-216x=0$

$4x(x^2-3x-54)=0$

$4x(x-9)(x+6)=0$

$x=0, 9, -6$

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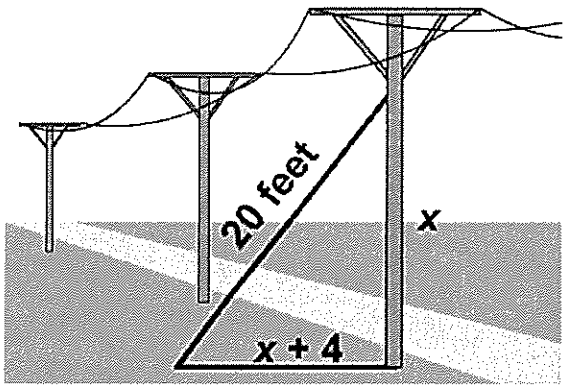
d) $15x^2-19x-8=0$

$(3x+1)(5x-8)=0$

$x=-\frac{1}{3} \quad x=\frac{8}{5}$

8) (7 points) A piece of wire measuring 20 feet is attached to a telephone pole as a guy wire. The distance along the ground from the bottom of the pole to the end of the wire is 4 feet greater than the height where the wire is attached to the pole. See the picture. How far up the pole does the guy wire reach? Assume the triangle forms a right triangle.



$x^2+(x+4)^2=20^2$

$x^2+x^2+8x+16=400$

$2x^2+8x-384=0$

$2(x^2+4x-192)=0$

$2(x-12)(x+16)=0$

$x=12$ ✓ $\quad x=-16$ ✗

12 ft

9) (7 points) While mid-air, a cow gymnast calculates that the distance her hooves off the ground can be approximated by the function $h(t)=-16t^2+16t+32$ where t is time in seconds and h is height in feet. At what time will the cow's hooves land on the ground?

$-16t^2+16t+32=0$

$-16(t^2-t-2)=0$

$-16(t-2)(t+1)=0$

$t=2$ ✓ $\quad t=-1$ ✗

2 seconds

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