Math 2 HW 6

5:1)

1) $4xy + 4x$

$4x(y+1)$

6) $24x^2yz + 2xy^2z^2 + 4xyz^3$

$= 2(xyz)(12x + yz + 2z^2)$

4 5) $6x^2y + 3xy + 9xy^2$

$= 3xy(2x + 1 + 3y)$

5.2) 1) $4y^2 - 9z^2$

$= (2y)^2 - (3z)^2$

$= (2y - 3z)(2y + 3z)$

2) $16x^2 - 36y^2$

$= (4x)^2 - (6y)^2$

$= (4x - 6y)(4x + 6)$

3) $16x^4 - y^6$

$= (4x^2)^2 - (y^3)^6$

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

4) $16x^4 - y^4$

$= (4x^2)^2 - (y^2)^2$

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

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

5.3

2) $2ax+3ay+2bx+3by$

$= a(2x+3y)+b(2x+3y)$

$= (2x+3y)(a+b)$

---

3) x^4-x^3y+x-y

$= x^3(x-y)+(x-y)$

$= (x-y)(x^3+1)$

Note you can use a formula in 5.2 to factor x^3+1 further as $x^3+1=(x+1)(x^2-x+1)$

---

4) $x^5-x^4y+2x-2y$

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

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

6) $x^5-x^3y^2-x^2y^3+y^5$

$= x^3(x^2-y^2)-y^3(x^2-y^2)$

$= (x^3-y^3)(x^2-y^2)$

$= (x^3-y^3)(x-y)(x+y)$

Note you can use a formula in 5.2 to factor x^3-y^3 as $(x-y)(x^2+xy+y^2)$

5.5

1) $\frac{7}{\sqrt{2}-1} = \frac{7}{\sqrt{2}-1} \cdot \frac{\sqrt{2}+1}{\sqrt{2}+1}$

$= \frac{7\sqrt{2}+7}{2-1}$

$= 7\sqrt{2}+7$

2) $\frac{x+\sqrt{2}}{2} = \frac{x+\sqrt{2}}{2} \cdot \frac{x-\sqrt{2}}{x-\sqrt{2}}$

$= \frac{x^2-2}{2x-2\sqrt{2}}$

5) $\frac{x^2-3}{x-\sqrt{3}} = \frac{x^2-3}{x-\sqrt{3}} \cdot \frac{x+\sqrt{3}}{x+\sqrt{3}}$

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

$= x+\sqrt{3}$

6) $\frac{x^4-36}{x+\sqrt{6}}$

$= \frac{(x^2)^2-6^2}{x+\sqrt{6}}$

$= \frac{(x^2-6)(x^2+6)}{x+\sqrt{6}}$

$= \frac{(x^2-6)(x^2+6)}{x+\sqrt{6}} \cdot \frac{x-\sqrt{6}}{x-\sqrt{6}}$

$= \frac{(x^2-6)(x^2+6)(x-\sqrt{6})}{x^2-6}$

$= (x^2+6)(x-\sqrt{6})$

7.1

1 a) $120^\circ = \frac{120 \cdot 2\pi}{360}$ rad

$= \frac{2\pi}{3}$ rad

c) $135^\circ = \frac{135 \cdot 2\pi}{360}$ rad

$= \frac{3\pi}{4}$ rad.

e) $-150^\circ = \frac{-150 \cdot 2\pi}{360}$ rad

$= \frac{5\pi}{6}$ rad

3) a) $\frac{3\pi}{4}$ rad $= \frac{3\pi}{4} \cdot \frac{360}{2\pi}$ degrees

$= 135$ degrees.

c) $-\frac{\pi}{3}$ rad $= -\frac{\pi}{3} \cdot \frac{360}{2\pi}$ degrees

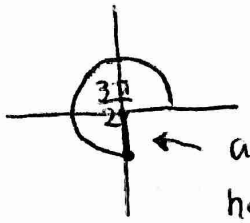
$= -60$ degrees.

e) $\frac{9\pi}{2}$ rad $= \frac{9\pi}{2} \cdot \frac{360}{2\pi}$ degrees

7.2

1) a) $\sin(\frac{7\pi}{2})$

$\frac{7\pi}{2} - 2\pi = \frac{3\pi}{2}$



adjacent = 0

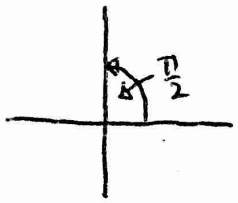
hypotenuse = 1

and opposite has the same size but different sign

$\Rightarrow \sin(\frac{7\pi}{2}) = -1$

1 b) $\cos \frac{5\pi}{2}$

$\frac{5\pi}{2} - 2\pi = \frac{\pi}{2}$

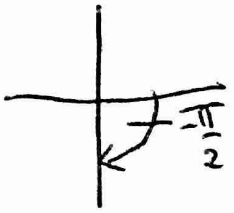


$\cos(\frac{5\pi}{2}) = 0$

(c) $\cos\left(-\frac{9\pi}{2}\right)$

$-\frac{9\pi}{2} + 2\pi = -\frac{5}{2}\pi$

$-\frac{5\pi}{2} + 2\pi = -\frac{\pi}{2}$



$\cos\left(-\frac{9\pi}{2}\right) = 0$

---

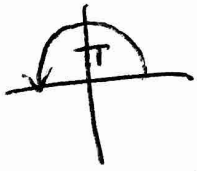
1 d) $\sin(101\pi)$

$101\pi - 2\pi = 99\pi$

$99\pi - 2\pi = 97\pi$

$\vdots$

$3\pi - 2\pi = \pi$



$\sin(101\pi) = 0$