Problem 1

i. $\sin(\frac{\pi}{4})$
$\frac{\pi}{4} \times \frac{180}{\pi} = 45°$
$\sin(45°) = \frac{\sqrt{2}}{2}$

ii. $\sin \frac{\pi}{2}$
$\sin(90°) = 1$

iii. $\sin \frac{\pi}{3}$
$\sin(60°) = \frac{\sqrt{3}}{2}$

iv. $\sin(0) = 0$

v. $\cos(0) = 1$

vi. $\cos(\frac{\pi}{3})$
$\cos(60°) = \frac{1}{2}$

vii. $\cos(\frac{3\pi}{4})$
$\cos(135°) = \cos(180° - 45°)$
$\cos(45°) = \frac{1}{2}$

viii. $\cos(-\frac{\pi}{6})$
$\cos(-60°) = -\cos(30°) = \sin(30°) = \frac{1}{2}$

ix. $\tan(\frac{2\pi}{3})$
$\tan(120°) = \tan(180° - 60°) = \tan(60°) = -\sqrt{3}$

x. $\tan(\frac{5\pi}{4})$
$\tan(255°) = \tan(180° + 45°) = \tan(45°) = 1$

Problem 2

a) i. $r = \sqrt{3^2 + 4^2} = 5$
$\tan\theta = \frac{4}{3}$
$\theta = \arctan\frac{4}{3} = 53,13$
$(5; 53,13°)$

ii. $r = \sqrt{\sqrt{3}^2 + 1^2} = 2$
$\tan\theta = \frac{1}{\sqrt{3}}$
$\theta = \arctan\frac{1}{\sqrt{3}} = 30$
$(2, 30°)$

iii. $r = \sqrt{-2^2 + 2^2} = 0$
$\theta = \arctan\frac{-2}{2} = -45$
$(0, -45°)$

iv. $r = \sqrt{0^2 + 1^2} = 1$
$\theta = \arctan\frac{1}{0} = 90°$
$(1, 90°)$

v. $r = \sqrt{5^2 + 12^2} = 13$
$\theta = \arctan\frac{12}{5} = 67,3801°$
$(13; 67,3821°)$

b) vi. $y = r\sin\theta$
$y = 1 \times \sin(0°) = 0$
$x = r\cos\theta$
$x = 1 \times \cos(0°) = 1$
$(0, 1)$

vii. $\theta = 60°$
$x = 3 \times \sin(60°) = \frac{3\sqrt{3}}{2}$
$y = 3 \times \cos(60°) = \frac{3}{2}$
$(\frac{3\sqrt{3}}{2}; \frac{3}{2})$

viii. $\theta = 405°$
$x = 3 \times \sin(405°) = \frac{3\sqrt{2}}{2}$
$y = 3 \times \cos(405°) = \frac{3\sqrt{2}}{2}$
$(\frac{3\sqrt{2}}{2}; \frac{3\sqrt{2}}{2})$

ix. $\theta = 120°$
$x = 5 \times \sin(120°) = \frac{5\sqrt{3}}{2}$
$y = -5 \times \cos(120°) = -\frac{5}{2}$
$(\frac{5\sqrt{3}}{2}; -\frac{5}{2})$

x. $\theta = 330°$
$x = 2 \times \sin(330°) = -\frac{2}{2} = -1$
$y = 2 \times \cos(330°) = \frac{2\sqrt{3}}{2}$
$(-1; \frac{2\sqrt{3}}{2})$

Problem 3

a) i. $\frac{x^5 \times x^2}{x^3}$
$= x^4$

ii. $e^2 \times e^{-4}$
$= \frac{e^2}{e^4}^{1}$
$= \frac{1}{e^2}$
$= e^{-2}$

b) i. $x^2 + 10x$
$= x(x + 10)$

ii. $x^2 + 4x + 3$
$= (x + 3)(x + 1)$

iii. $x^2 + 8x + 16$
$= (x + 4)(x + 4)$

iv. $x^2 - 64$
$= (x - 8)(x + 8)$

v. $x^2 - 3x - 28$
$= (x - 4)(x + 7)$

vi. $\frac{e^3x^2+e^2x}{ex+1}$

$= \frac{e^2x(\cancel{ex+1})}{\cancel{ex+1}}$

$= e^2x$

Problem 4

a) i. $\sum_{k=1}^{9} k$

$= 1+2+3+4+5+6+7+8+9$

$= 45$

ii. $\sum_{k=1}^{5} k^2$

$= 1^2+2^2+3^2+4^2+5^2$

$= 55$