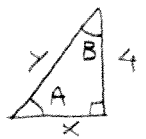
① a) $\frac{4x}{2} = 4$ ger $\underline{\underline{x = 2}}$



b) $y^2 = x^2 + 4^2$ ger $y^2 = 4+16$
och $y = \sqrt{20} = \underline{\underline{2\sqrt{5}}}$

c) $\cos A = \frac{2}{2\sqrt{5}}$ $A = \arccos\frac{1}{\sqrt{5}} \approx \underline{\underline{63^\circ}}$
$B = 180^\circ - 90^\circ - 63^\circ = \underline{\underline{27^\circ}}$

---

② $0 = 2x^2 - 7x + 6 = 2\left[x^2 - \frac{7}{2}x + 3\right] = 2\left[\left(x - \frac{7}{4}\right)^2 - \frac{49}{16} + 3\right] =$

a) $= 2\left[\left(x - \frac{7}{4}\right)^2 - \frac{1}{16}\right]$, $\left(x - \frac{7}{4}\right)^2 = \frac{1}{16}$, $x = \frac{7}{4} \pm \frac{1}{4}$

$\underline{\underline{x_1 = 2, \quad x_2 = \frac{3}{2}}}$

b) $2x^2 - 7x + 6 = 2\left[x^2 - \frac{7}{2}x + 3\right] = 2(x-2)\left(x - \frac{3}{2}\right) = \underline{\underline{(x-2)(2x-3)}}$

c) $2x^2 - 7x + 6 = 2\left(x - \frac{7}{4}\right)^2 - \frac{1}{8}$ ⇒ minsta värde $\underline{\underline{-\frac{1}{8}}}$

---

③ $8v - 3u = (16, -8) - (15, -6) = (1, -2)$

$(1,-2)\cdot(5,-2) = |(1,-2)|\,|(5,-2)|\cos\theta$

$9 = \sqrt{5}\sqrt{29}\cos\theta$ $\theta = \arccos\frac{9}{\sqrt{145}} \approx \underline{\underline{41{,}6^\circ}}$

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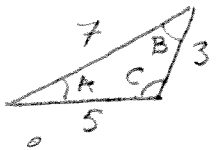
④ a) Cosinussatsen:



$7^2 = 3^2 + 5^2 - 2\cdot3\cdot5\cos C$

$30\cos C = 9 + 25 - 49 = -15$

$\cos C = -\frac{1}{2}$, dvs $\underline{\underline{C = 120^\circ}}$

$5^2 = 7^2 + 3^2 - 2\cdot3\cdot7\cos B$

$42\cos B = 49 + 9 - 25 = 33$

$\underline{\underline{B = \arccos\frac{33}{42} \approx 38^\circ}}$

$\underline{\underline{A = 180 - 120 - 38 = 22^\circ}}$

b) Arean $= \frac{5\cdot3\cdot\sin 120^\circ}{2} = \underline{\underline{\frac{15\sqrt{3}}{4} \approx 6{,}5}}$

---

⑤ a) $\frac{(a^3b^2)^{-2}}{\left((\sqrt{a})^{-3}(\sqrt{b})^{-5}\right)^2} = \frac{a^{-6}b^{-4}}{\left(a^{-3/2}b^{-5/2}\right)^2} = \frac{a^{-6}b^{-4}}{a^{-3}b^{-5}} = \underline{\underline{\frac{b}{a^3}}}$

b) $\frac{x^5 - xy^4}{(x^2+y^2)(x^2+xy)} = \frac{x(x^4-y^4)}{x(x^2+y^2)(x+y)} = \frac{(x^2+y^2)(x^2-y^2)}{(x^2+y^2)(x+y)} =$

$= \frac{(x+y)(x-y)}{(x+y)} = \underline{\underline{x-y}}$

---

⑥ $2\lg x - \lg(x-2) = \lg x + \lg 2 \quad \Leftrightarrow$

$\lg\frac{x^2}{x-2} = \lg 2x \Rightarrow \frac{x^2}{x-2} = 2x$

$x^2 = 2x(x-2) = 2x^2 - 4x$, $x^2 - 4x = 0$

$x(x-4) = 0$ $x = 0$ är omöjligt dv

ekvationen giltig endast för $x > 2$. $\underline{\underline{x = 4}}$.

---

⑦ $4z^4 + 1 = 0 \Leftrightarrow z^4 = -\frac{1}{4}$ Skriv polärt:

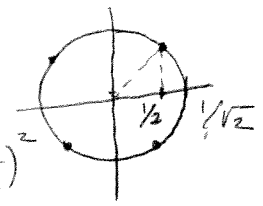
$(re^{i\theta})^4 = \frac{1}{4}e^{i\pi + n\cdot2\pi i}$ Vi får

$r^4 = \frac{1}{4}$, dvs $r = \frac{1}{\sqrt{2}}$ och $4\theta = \pi + n\cdot2\pi$,

dvs $\theta = \frac{\pi}{4} + n\cdot\frac{\pi}{2}$

Rötterna kan skrivas (se fig.)

$\underline{\underline{\pm\frac{1}{2} \pm \frac{i}{2}}}$



(obs $\left(\frac{1}{\sqrt{2}}\right)^2 = \left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^2$)

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⑧ Division ger $\frac{x^3+x^2-3x+4}{x^2+x-2} = x + \frac{-x+4}{x^2+x-2}$.

Eftersom $x^2+x-2 = (x-1)(x+2)$ gör vi ansättning:

$\frac{-x+4}{(x-1)(x+2)} = \frac{a}{x-1} + \frac{b}{x+2}$ Multiplikation med $(x-1)(x+2)$:

$-x+4 = a(x+2) + b(x-1)$.

$x = -2$ ger $b = -2$, $x = 1$ ger $a = 1$

$\underline{\underline{\frac{x^3+x-3x-4}{x^2+x-2} = x + \frac{1}{x-1} - \frac{2}{x+2}}}$