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(3) (a) $\frac{3}{(1+i)(2+i)} = \frac{3}{3+i+2i+i^2}$

$3 \times 3 + 1 = 10$

$= \frac{3}{1+3i} = \frac{3(1-3i)}{10}$

$= \frac{3(1-3i)}{10} = \frac{3}{10} - \frac{9}{10}i$

$\frac{3}{10}$

b) $z = (4+7i)(3-2i)$ $4 \cdot 3 - 7(-2) = 26$

$12 - 8i + 21i - 14i^2$ $4(-2) + 7 \cdot 3 = 13i$

$= 26 + 13i$

$a + b$

$a = 26 \quad b = 13$

$26^2 = 676$
$13^2 = 169$

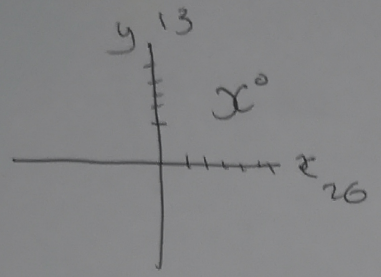
$r = \sqrt{a^2+b^2} = \sqrt{26^2+13^2} = 13\sqrt{5}$ or 29.07

$\theta = \tan^{-1} = \left(\frac{13}{26}\right) = 26.57°$ $r = 29.07$

PTO

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Q3 Continued b)



$r=(\cos\theta+\sin\theta) = 29.07(\cos 26.57° + \sin 26.57°)$

Polar form $= 29.07 \angle 26.57°$

Q3 i) $\left(\frac{1+i}{1-i}\right)^3$

$i^2=-1$

$= \frac{1+i}{1-i} \times i = \frac{1i+1^2}{1i+i^2} = \frac{1i+(-1)}{1i-(-1)}$

$= \frac{1+i}{1-i} \times \frac{(1+i)}{(1-i)} = \frac{1\times1+1i+1i+1^2}{1\times1-i-i+1^2}$

$= \frac{1+2i+1}{1+1^2}$

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$$(Q2(a)) = \int_0^4 e^{\frac{1}{2}x}\,dx$$

Let $u = \frac{1}{2}x$ $\quad \frac{du}{dx} = \frac{1}{2}x$ $\quad du = \frac{1}{2}x \cdot dx$

$$dx = \frac{du}{\frac{1}{2}x}$$

$$= \int_0^4 e^u$$

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Q3 iii) $= \frac{1+i}{1-i} - \underline{(1+2i)(2+2i)} + \frac{3-i}{1+i}$

↓

$(1+2i)(2+2i)$

$3+4i^2+4i+4i^2$ $\quad i^2=-1$

$3+8i^2+4i$

$3+8(-1)+4i$

$-5+4i$

$\frac{1+i}{1+i} \times \frac{1-i}{1-i} = \frac{(1+i)(1-i)}{(1+i)(1-i)} = \frac{1-i+i-i^2}{1+i+i-i^2}$

$= \frac{1-(-1)=2}{1+2i-(-1)}$

$1+i$

$\Rightarrow -5+4i+i$ (so far)

$\frac{3-i}{1+i} \times \frac{1-i}{1-i} = \frac{3-i-i+i^2}{1-i+i-i^2}$

$= \frac{3-2i+(-1)=4-2i}{1-(-1)=2}$

$\frac{4-8i}{4} = \frac{2}{1}i = 2i$

$= \frac{8}{8i} = i$

Answer

$=-5+4i+2i+i$

$=-5+7i$