$f(1) = f(0) + 1$

$f(2) = f(0) + 1 + 3$

$f(3) = f(0) + 1 + 3 + 5$

$\vdots$

$f(x) = f(0) + x^2$

$\sum_{i=1}^{50} [f(0) + i^2] < 50{,}000$

$50 f(0) + \frac{50(51)(101)}{60} < 50{,}000$

$f(0) < 141.5$

$\boxed{141}$

$\begin{vmatrix} & & \\ 2 & 6 & 1 \\ x & x+2 & x-2 \end{vmatrix}$

$x(6x - 12 - x - 2) - 2(2x - 4 - x^2 - 2x) + x(2 - 6x)$

$x(5x - 14) + 8 + 2x^2 + 2x - 6x^2$

$5x^2 - 14x + 8 + 2x^2 + 2x - 6x^2$

$x^2 - 12x + 8$

$(x-6)^2 - 28$

$\boxed{-28}$

③ $A = 6^5 + 6^4 + 4\,6^3 + 6^2 + 4 \cdot 6 + 6 = 10{,}000$

$B = 7^5 + 3 \cdot 7^4 + 4 \cdot 7^3 + 3 \cdot 7^2 + 6 \cdot 7 + 3 = 25574$

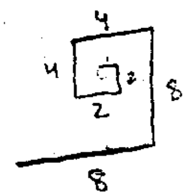
$C = 3 \cdot 5^5 + 5^4 + 2 \cdot 5^2 + 5 = 10055$

$D = 4(9^3) + 4(9^2) + 9 + 1 = 3250$

$A + B + C + D = 48879$

$48879_{10} = BEEF_{16}$

④



East: $\frac{8}{1-\frac{1}{4}} = \frac{32}{3}$

West: $\frac{4}{1-\frac{1}{4}} = \frac{16}{3}$

North: $\frac{32}{3}$

South: $\frac{16}{3}$

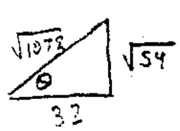
Horizontal: $\frac{16}{3}$

Vertical: $\frac{16}{3}$

Distance $= \frac{16\sqrt{2}}{3}$

⑤ $A = 4 + 10 + 18 = 32$

B: $\cos\theta = \frac{32}{\sqrt{14} \cdot \sqrt{77}} = \frac{32}{\sqrt{1078}}$



$\tan\theta = \frac{\sqrt{54}}{32}$

C: $\begin{array}{c} \langle 1\ 2\ 3 \rangle \\ \times \langle 4\ 5\ 6 \rangle \\ \hline -3\ \ 6\ \ -3 \end{array}$ $\quad \|{-3}\ \ 6\ \ {-3}\| = \sqrt{54}$

$D = 4$

$\frac{32}{32} \cdot \frac{\sqrt{54}}{\sqrt{54}} \cdot 4 = \boxed{4}$

$a_{13} = 24$ make a system

$$\begin{cases} 18 = a_1 + 9d \\ 24 = a_1 + 12d \end{cases}$$ Solved, $d = 2$ and $a_1 = 0$

$S_n = \frac{n}{2}[2a_1 + (n-1)d]$

S_n denotes the sum of the first n terms

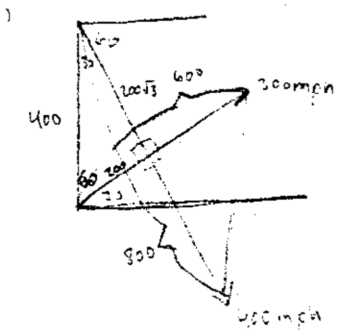
$S_{30} = \frac{30}{2}[2(0) + (30-1)2] = 15(29)(2) = 870$

$a_{20} = 0 + (20-1)2 = 19(2) = 38$

Ⓒ $a_{35} = 0 + (35-1)2 = (34)2 = 68$

Ⓓ $S_{25} = \frac{25}{2}[2(0) + (25-1)2] = \frac{25}{2}(24)(2) = 600$

$A + B + C + D = 870 + 38 + 68 + 600 = \boxed{1576}$



$\sqrt{(200 - 200\sqrt{3})^2 + (400)^2} = \boxed{604.77}$

$x = 27\,\text{cis}(0 + 2k\pi)$

$\sqrt[3]{x} = \sqrt[3]{27}\,\text{cis}\left(0 + \frac{2k\pi}{3}\right)$

$\sqrt[3]{x} = 3\,\text{cis}\,0,\ \underline{3\,\text{cis}\,\frac{2\pi}{3}},\ 3\,\text{cis}\,\frac{4\pi}{3}$

$3\,\text{cis}\,\frac{2\pi}{3}$ is in second quadrant

$x = 32\,\text{cis}(0 + 2k\pi)$

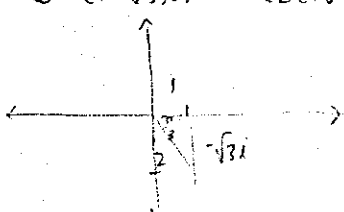
$\sqrt[5]{x} = \sqrt[5]{32}\,\text{cis}\left(0 + \frac{2k\pi}{5}\right)$

$r\,|\text{cis}\,\theta| = 1$

$5\,|2\,\text{cis}(0 + \frac{2k\pi}{5})| = 10$

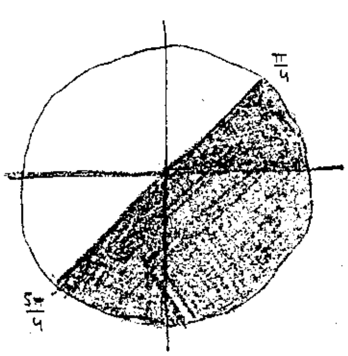
Ⓒ $\dfrac{(2\,\text{cis}\,\frac{\pi}{5})^5}{8\,\text{cis}\,\frac{\pi}{3}} = \dfrac{2^5\,\text{cis}\,5(\frac{\pi}{5})}{8\,\text{cis}\,\frac{\pi}{3}} = \dfrac{32\,\text{cis}\,\pi}{8\,\text{cis}\,\frac{\pi}{3}} = 4\,\text{cis}(\pi - \frac{\pi}{3}) = 4\,\text{cis}\,\frac{2\pi}{3}$

Ⓓ $(1 - \sqrt{3}i)^5 = (2\,\text{cis}\,\frac{5\pi}{3})^5 = 2^5\,\text{cis}\,\frac{\pi}{3} = 32\,\text{cis}\,\frac{\pi}{3}$



$\dfrac{4AB}{C} + D = \dfrac{4(3\,\text{cis}\,\frac{2\pi}{3})(10)}{4\,\text{cis}\,\frac{2\pi}{3}} + 32\,\text{cis}\,\frac{\pi}{3} = \boxed{46 + 16\sqrt{3}}$

$32\,\text{cis}\,\frac{\pi}{3} = 32(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}) = 32(\frac{1}{2} + \frac{\sqrt{3}}{2}i) = 16 + 16\sqrt{3}i$

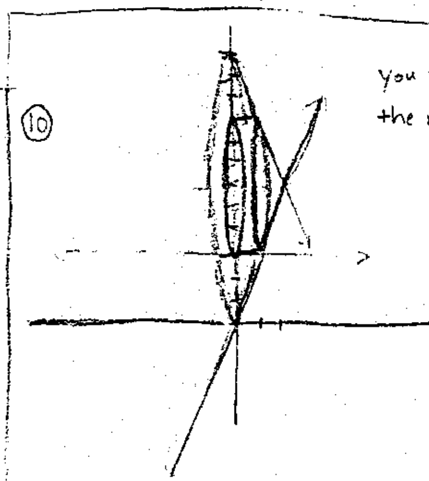


$\sin x - \cos x < 0$

$\sin x < \cos x$

$\boxed{\frac{5}{12}}$

⑩



you want the Volume of the skirt and the middle cylinyder and cone.

$\dfrac{2 \cdot 36\pi}{3} - \left[\dfrac{1 \cdot 9\pi}{3} + 1 \cdot 9\pi\right]$

bigcone − [sm. cone + cylinder]

$24\pi - [3\pi + 9\pi] = \boxed{12}$

2^{nd} quadrant or exit from the 4^{th} quadrant. True

$$\text{Arcsin}\left(\cos\left(\frac{3\pi}{4}\right)\right)$$

remember your range rules.

$$\text{Arcsin}\left(\frac{-\sqrt{2}}{2}\right) = \boxed{-\frac{\pi}{4}}$$

(b) Not true in all cases. If there are 4 imaginary roots, f(x) would only cross the x-axis once.

$$\frac{\text{Arccsc}(\sqrt{2})}{2} = \frac{\frac{\pi}{4}}{2} = \boxed{\frac{\pi}{8}}$$

(c) As x approaches infinity, f(x) approaches $-\infty$, thus, the limit does not exist. True.

$$\boxed{\frac{\pi}{4}}$$

$$-\frac{\pi}{4} + \frac{\pi}{8} + \frac{\pi}{4} = \boxed{\frac{\pi}{8}}$$ ← final answer

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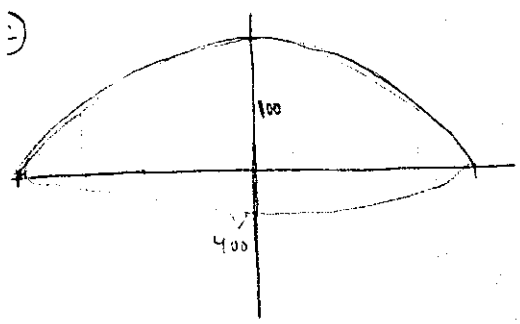


The equation of the bridge is

$$\boxed{\frac{x^2}{(200)^2} + \frac{y^2}{(100)^2} = 1}$$

Solve for y

$$y = \sqrt{10{,}000 - \frac{1}{4}x^2}$$

plug in for x: 0, 50, 100, and 150

double these values since they are same on both sides of the bridge.

$$100 + 2\left(\sqrt{9375}\right) + 2\left(\sqrt{7500}\right) + 2\left(\sqrt{4375}\right) =$$

$$\boxed{599.14}$$

)

$$\frac{90°}{360°} \cdot 2 \cdot 4\pi = 2\pi \text{ in/s} = r$$

$$5 = 1.5t$$

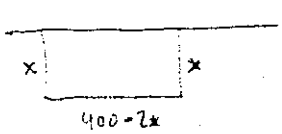
$$t = \frac{10}{3}$$

$$d = rt$$

$$d = \frac{10}{3} \cdot 2\pi$$

$$\boxed{\frac{20\pi}{3}}$$

4)



$$x(400 - 2x) = A(x)$$

$$A(x) = -2(x^2 - 200x)$$

$$A(x) = -2(x^2 - 200x + 10{,}000) + \underline{20{,}000}$$

max area in yards

$$(20{,}000)(9) = \boxed{180{,}000 \text{ ft}^2}$$

15 (a) $\log_2(\log_2(\log_2(x))) = 1$

$$\log_2(\log_2(x)) = 2^1$$

$$\log_2(x) = 2^2$$

$$2^4 = x$$

$$\boxed{x = 16}$$

$$\log \frac{16 \cdot 25^2}{100}$$

$$\log \frac{2^4 \cdot 5^4}{10^2}$$

$$\log(10^2)$$

$$\boxed{2}$$

(b) $\frac{100}{4} = \boxed{25}$

(c) $x = \sqrt{100 + 99\sqrt{100 + 99\sqrt{\dots}}}$

$$x^2 = 100 + 99\sqrt{100 + 99\sqrt{\dots}}$$

$$x^2 - 100 = 99x$$

$$x^2 - 99x - 100 = 0$$

$$(x - 100)(x + 1)$$

$$x = \{100, \cancel{-1}\}$$

$$\boxed{100}$$