MULT CHOICE

(1) COMPLETE THE SQUARE TO CONVERT

$y = ax^2 + bx + c \rightarrow y - k = a(x-h)^2$

(h,k) IS THE VERTEX

$a > 0$

$a < 0$

BIG $|a|$ —

SMALL $|a|$ —

$y = 3x^2 - 5x + 10$

(a)

$y = 3\left(x^2 - \frac{5}{3}x\right) + 10$

$\frac{1}{2}$ of this & square it & ADD & SUBTRACT IT.

$y = 3\left(x^2 - \frac{5}{3}x + \frac{25}{36} - \frac{25}{36}\right) + 10$

$y = 3\left(\left(x^2 - \frac{5}{6}\right)^2 - \frac{25}{36}\right) + 10$

$y = 3\left(x^2 - \frac{5}{6}\right)^2 - \frac{25}{12} + 10$

$y - \frac{95}{12} = 3\left(x^2 - \frac{5}{6}\right)^2$

k a h

4. RAT. FCTNS HAVE V.A. WHERE DEN = 0 BUT NUM $\neq 0$.

$(ax+b)(cx+d)$ $\qquad$ $(4x+3)^2$

$-b/a$ $\quad$ $-d/c$ & want them the same

5. $m = 5/6$ FOR GIVEN LINE

$\perp$ $m = -6/5$ $\qquad y - 1 = -6/5(x-3)$

6. $f(3) = 2 \cdot 2 + 1 = 5$

$f(4) = 2 \cdot 5 + 2 = 12$

$f(5) = 2 \cdot 12 + 5 = 29$

$f(0) = 7$

$f(n) = 6 \cdot f(n-1)$ } recursive

$f_0 = 7$

$f_1 = 6 \cdot 7$

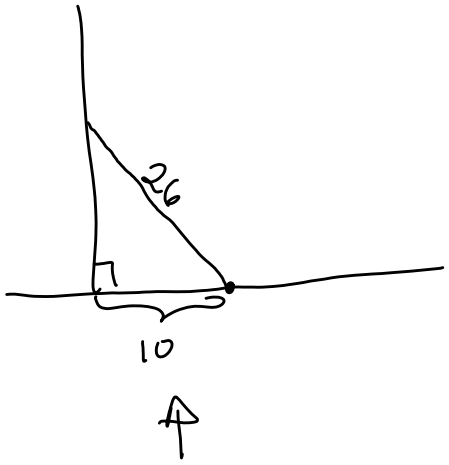
$f_2 = 6^2 \cdot 7$

$f_3 = 6^3 \cdot 7$

$f_{87} = 6^{87} \cdot 7$

$f_n = 6^n \cdot 7$ explicit

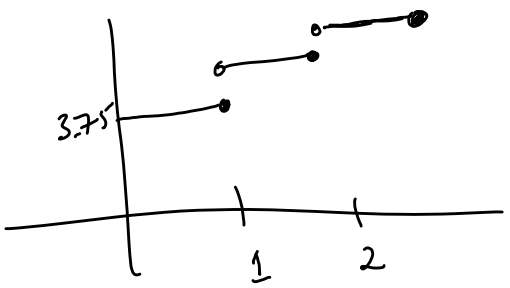
9.



MEDIAN — ODD DATA SET — MIDDLE VALUE

EVEN DATA SET — AVG 2 MIDDLE VALUES.

11.



$$\begin{array}{r} 11.45 \\ -\ 3.75 \\ \hline 7.70 \end{array} \quad \begin{array}{l} \leftarrow 1\ \text{min.} \\ \leftarrow 14\ \text{min.} \end{array}$$

$55\sqrt{770}$

12. IF $ax^2+bx+c=0$ (homogeneous equation)

THEN $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$ } QUAD FORMULA.

DISCRIMINANT. IF <0, NO REAL SOLUTIONS.

13. $(\cos\theta + i\sin\theta)^n = (\cos n\theta + i\sin n\theta)$ → DeMoivre's Thm

$8\cos(30) + 8i\sin(30^\circ)$

$= 8\frac{\sqrt{3}}{2} + 8i\frac{1}{2} = 4\sqrt{3} + 4i$

14. $\dfrac{8^\circ}{180^\circ} = 4\%$

15. $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 2 & -3 & 5 \\ 1 & 4 & -3 \end{bmatrix} = \begin{bmatrix} -1\cdot 2+0\cdot 1 & -1\cdot -3+0\cdot 4 & -1\cdot 5+0\cdot -3 \\ 1 & 4 & -3 \end{bmatrix}$

$= \begin{bmatrix} -2 & 3 & -5 \\ 1 & 4 & -3 \end{bmatrix}$

$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

} Identity

16 EQUIVALENCE RELATION, $\sim$

1. $x \sim x$ (Reflexive)
2. $x \sim y \rightarrow y \sim x$ (Symmetric)
3. $x \sim y$ and $y \sim z \rightarrow x \sim z$ (TRANSITIVE)

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ex FOR REAL NUMBERS r AND s, SAY

$r \sim s$ IF $s - r$ IS AN INTEGER

$\{x \in \mathbb{R} \mid x \sim \pi\}$ ← EQUIVALENCE CLASS OF π.

20 vol. $(1.5)^3$ cm^3

$\times 11.3$ g

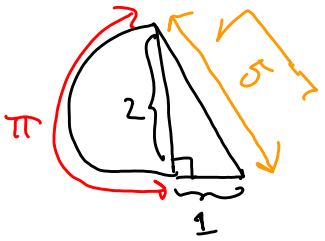
25 $f(x) = -x^{-2}$ $\quad f'(x) = -(-2)x^{-3} = 2x^{-3}$

29

$$\gamma = \frac{A d v}{b}$$

$$= \frac{\cancel{cm^2} \cdot \frac{g}{\cancel{cm^3}} \cdot \frac{\cancel{cm}}{s}}{s} = g/s \Big/ s = g/s^2$$

30



$$1 + \pi + \sqrt{5} \approx 6.4\ldots$$

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$s(t)$ = position of something at time t.

$v(t) = s'(t)$ = velocity.

$a(t) = v'(t) = s''(t)$ = acceleration

$j(t) = a'(t) = v''(t) = s'''(t)$.

avg. $v = \frac{\text{dist}}{\text{time}}$

Given $v(t) = 1.8t^2$

START POSITION s_0

$$s(t) = \int 1.8t^2\,dt = \frac{1.8t^3}{3} + C$$

$$s(t) = \frac{1.8t^3}{3} \qquad s(5) = \frac{1.8 \cdot 125}{3} = \ldots$$

36. $y = 2x^3 - x + 3$ point $(1, 4)$

$y' = 6x^2 - 1$ $m = 5$

42 (t, Q)

$(0, 1000)$

$(10, 5000)$

$Q = Q_0 e^{xt}$

$1000 = Q_0 e^{x \cdot 0} = Q_0$

$5000 = 1000\, e^{10x}$

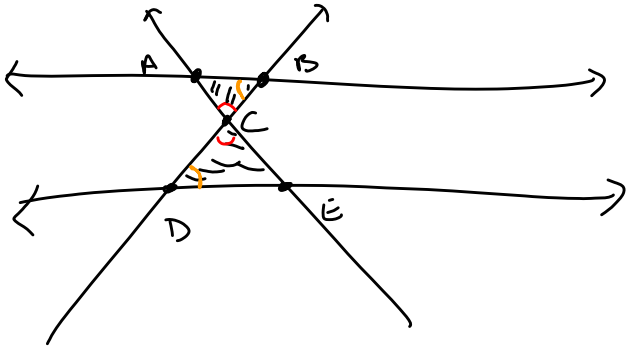
$5 = e^{10x}$

$\ln 5 = \ln(e^{10x})$

$\ln 5 = 10x$

$\frac{\ln 5}{10} = x$

45



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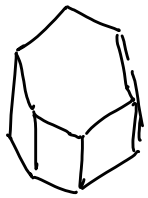
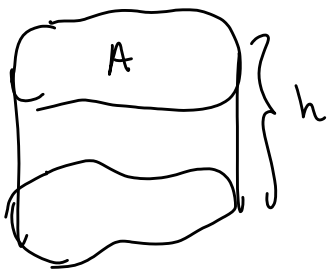


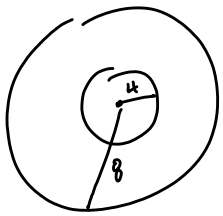


$V = A \cdot h$

$\frac{(n-2)180^\circ}{n}$ = size of 1 angle in a reg n-gon.

PMP

(1)



$$\frac{\frac{4}{3}\pi 8^3 - \frac{4}{3}\pi 4^3}{\frac{4}{3}\pi 8^3} = \frac{8^3 - 4^3}{8^3} = \frac{7}{8}$$

(2) LET x BE # of SCI. CALC
y # of graph. calc

$x+y \geq 200$

$x \geq 100$

$y \geq 80$

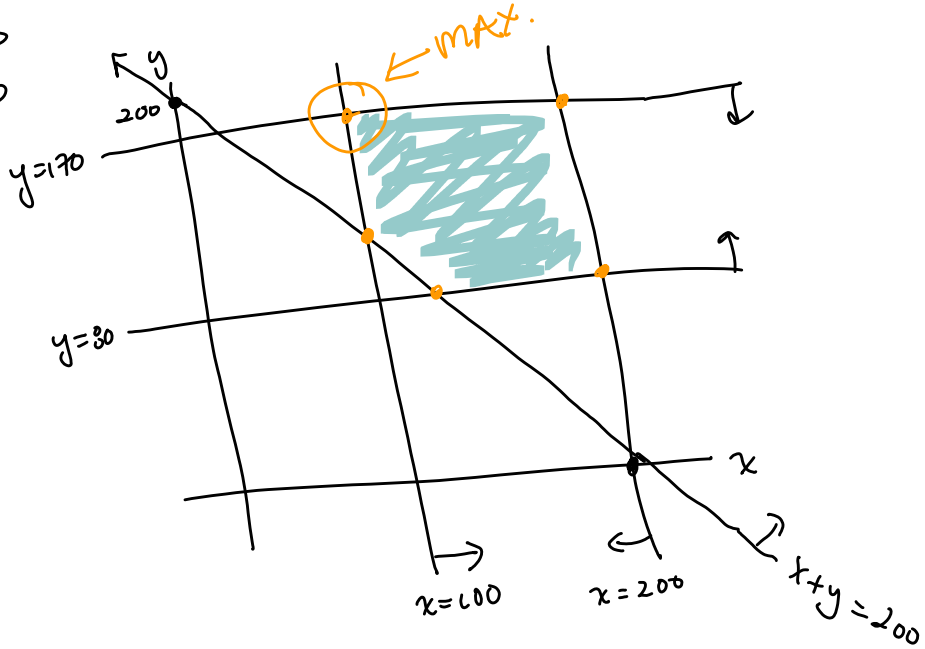
$x \leq 200$

$y \leq 170$

$x, y \geq 0$

MAXIMIZE PROFIT

$-2x+5y$



CP	$-2x+5y$
(100, 170)	___
(200, 170)	___
(200, 80)	___
(100, 100)	___
(120, 80)	___

3. a) SHOW THAT FOR ANY FUNCTION $f(x)$, $\underbrace{f(x)+f(-x)}_{g(x)}$ IS EVEN.

WTS. $g(x)$ IS EVEN.

$$g(x) = g(-x).$$

COMPUTE $g(-x)$ & SHOW ITS THE SAME as $g(x)$.

$$g(-x) = f(-x)+f(-(-x)) = f(-x)+f(x) = f(x)+f(-x) = g(x)$$

(+ IS COMMUTATIVE)

b) $h(x) = f(x) - f(-x)$ ...

c) $g(x) = f(x) + f(-x)$

$h(x) = f(x) - f(-x)$

$\frac{g(x)+h(x)}{2} = \frac{2f(x)}{2}$

$$f(x) = \underbrace{\frac{g(x)}{2}}_{\text{even}} + \underbrace{\frac{h(x)}{2}}_{\text{odd}}$$

4. CHARGES \$1 FOR FIRST HALF MILE. , \$0.50 each addl mile.

a) \$2 ; \$1.5

b) $y = \begin{cases} 1 & x \le 1/2 \\ 1 + \lceil (x-1/2) \rceil \cdot 0.50 & x > 1/2. \end{cases}$

$\lceil x \rceil$ is least greater than. -

$y = 1 + (x - 1/2) \cdot 1/2$

$= 1 + \frac{1}{2}x - \frac{1}{4} \Rightarrow \quad y = \frac{1}{2}x + \frac{3}{4}$