

Twenty-Fifth Annual
University of North Georgia
Mathematics Tournament

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Mathematics Tournament

You may write in this test booklet. Only the el

)LQG WKH ^{WDQ}3QWBJUDO
x

D $\frac{WDQ}{x}$ C

E $\frac{WDQ}{x}$ C

F x WDQ | $\frac{WDQ}{x}$ C

G x WDQ- x OQ $\frac{WDQ}{x}$ C

H 1RQH RI WKH DERYH

7KH UDGLXV RI D HVSKHUH LV PHD,MLVPHUHFWR
— PP HVWLPDWH WKHLQURSDJRWKHUH
/HDYH \RXU DQVZHU LQ WHUPV RI

D $\frac{S}{x}$

E $\frac{S}{x}$

F S

G S

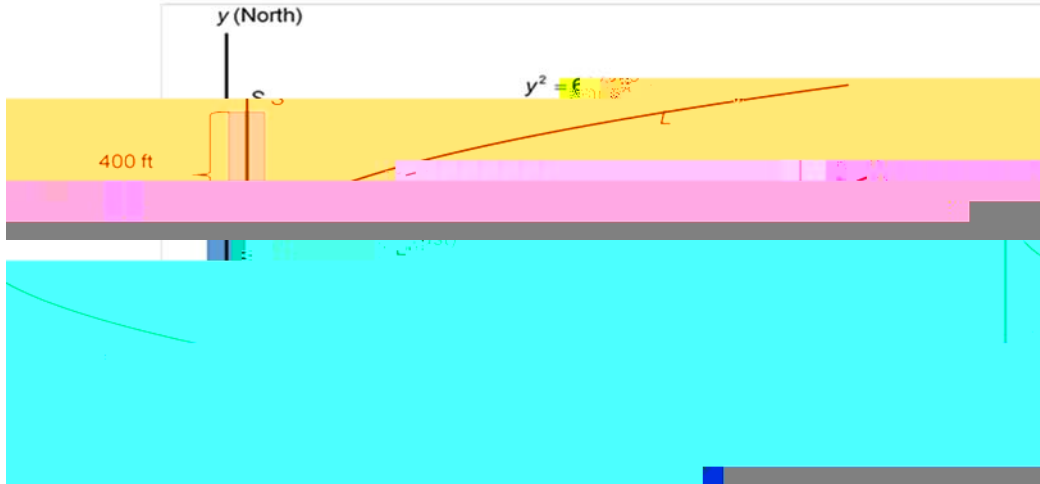
H 1RQH RI WKH DERYH

,I \RX QHGG WKLV GRFXPHQW LQ DQRWKHUJIRGRU ISDODVH HPD

)LQG DQ HTX DQWLRQWRO LVKHWRD WKH JDW SK SRLQW ZKHU
WKH WDQJHQW OLQZLW ENHW SDQWQWZKDFRVLWLYH
DQG WKH SRLQW OLHV LQ WKH ILUVP

,I \RX QHGH WKLV GRFXPHQW LQ DQRW#XQJIRGRDW ISDQOVH HPD

\$ UDLOURDG WUDLQ LV PRYLQJ DW DW SHHG R7KH PLUD F
 WKH VKDSH R_y WKH SUDKZOD , I W KHL W XQJ LLQ MXXH HDV
 KRZ IDVW SKHI WKH GDER PRRWLYHU DORQJ WKH ZDOO DW
 UHDFKHV WKH HQG RI WKH ZDOO



D PL K
 E PL K
 F PL K
 G PL K
 H 1RQH RI WKH DERYH

7ZR SODQH V DW WKH VDSHU DDFKLLVXUHQ WKH SRRUW KR Q E
 IURP WKH ZHVW 7KH SODQH IURP GWKVI QPULW RRP WKHL Q
 DLUSRUW 7KH SODQH IURP WKH ZPHWURP WOKHQD LUSRUW
 IDVW DUH WKH SODEK R V S W R D W K W Q D W L Q V W D Q W "

D PSK
 E PSK
 F PSK
 G PSK
 H 1RQH RI WKH DERYH

, I \RX QHHG WKLV GURFXUHQDW ISOHDQVW#FDL OI FX QVX FDOO

)LQG WKH3LQW HFDUO

D — VLQ — xLQ^x C

E — VLQ — xV^xEQC

F — VLQ — xV^xEQC

G — VLQ — xLQ^x C

H 1RQH RI WKH DERYH

8VH WKH &KDLQ 5XOH DQG WKH 6HF006 WRQLDGHQWDO

,I \RX QHHG WKLV GRFXPHQW LQ DQRWKXUJIRGRDW ISDHO VH HPD

)LQG WKHL_{x of} LPL^xW

D

E

F

G e

H 1RQH RI WKH DERYH

7KH VHW Ry SLQOMV SODxQHy|VDWLLWVLQJFXUYH HQFORV
D UHJLRQ &RPSXWH LWV DUHD

D —

E —

F

,I \RX QHHG WKLV GRFXPHQW LQ DQRW#XHQJIRGRDW ISDQDVH HPD

(YDOXDWH WKH ~~SHLDL~~^X LQWH LQWHJUDO
X

D \sqrt{OQ}

E \sqrt{OQ}

F -

G $\sqrt{DUFWD:Q}$ \sqrt{S} .
© 31

H 1RQH RI WKH DERYH

(YDOXDWH WKH ~~SHLDL~~^S LQWH LQWHJUDO
S

D FRV VLQ

E S

F

G VLQ FRV

H 1RQH RI WKH DERYH

)LQG WKH ~~SHLDL~~^x ~~SHLDL~~^{VLQ}
x^o f \sqrt{x} x

D f

E

F

G

H 1RQH RI WKH DERYH

s

/HW EH WKH FRQWLQXR X³ W~~DE~~ WL~~DO~~ Q~~3~~ $\frac{f(x)}{x}$ dx

ZKDW LV WK~~H~~ Y~~D~~ OXH RI

D

E

F

G

H 1RQH RI WKH DERYH

/HW WKH f(x) IF WL~~IR~~ Q WK~~D~~ W~~Q~~ G

/HfWEH D IXQEWLRFQDWDQW V X^x F^f K^t W^t KDW
:KDW LV WKH^c Y^c DOXH RI

D -

E -

F -

G

H 1RQH RI WKH DERYH

(YDOXDWH WKH G^f H^{dx} I^{dx} L^{dx} WH LQWHJUDO
x[√] x[√]

D - OQ

E e

F f

G OQ

H 1RQH RI WKH DERYH

/HMEH WKH IXQFWLRQ ZILMWHQ/EN WUKDISR @DRZLQJ

/HMVx f x x :KLFK RI WKH IROORZLQJ LV WUXH"

D h h h !

E h h h

F h h ! h !

G h h! h !

H 1RQH RI WKH DERYH

8VH WKH yDXFW WKDWR HYD^fOXDXWH

D -

E -

F -

G

H 1RQH RI WKH DERYH

,I \RX QHHG WKLV GRFXPHQW LQ DQRW#XHQJIRGRDWU ISDQDVH HPD

5HPLQGHU

4XHVWLRQ ZLOO EH XVHG DV D WLH EUHDNHU

)LQG WKH YROXPHU DLWKH ERORQDORQH UHJLRQ H

x x y DERXW xWKH OLQH

D ^S-OQ

E SOQ

F S

G S O Q

H 1RQH RI WKH DERYH

6XSSRVH D GLIHXUHQWLRQDORQH ERORQH ,I

f ZKDW LV WKH ODUJHVW SRVVLEOH YDOXH RI

D

E

F

G

H 1RQH RI WKH DERYH

6XSSRVH WKDW RQ WKH LQWHUYDO

ø

,I \RX QHGG WKLV GRFXPHQW LQ DQRWKHUJIRGRDW ISODD VH HPD

,I \RX QHHG WKLV GRFXPHQW LQ DQRWKHU IRUPDW SOHDVH HPD

6XSSfRX/H f x f y x y xy IRU DOO UHYDQOXPEHUV
x° x

)LQfG

D

E

F

G

H 1RQH RI WKH DERYH

7KH SRLQW RQ WKH FXUYH

,I \RX QHHG WKLV GRFXPHQW LQ DQRWKHUJIRGRUW ISDODVH HPD

