

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,MLVPHU DHFW WR
— PP HVWLPDWH WKHLQURSDJRWKHHURWKH VSKHUH
/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 ISDHO VH HPD

)LQG DQ HTX DQWLRQWRO LVKHWKWK JDWD SK SRLQW ZKHU
WKH WDQJHQW OLQZLW ENHW DQFDQDQW ZKDFR
DQG WKH SRLQW OLHV LQ WKH ILUVW TXDGUDQW

D x y

E x y

F x y

G x y

H 1RQH RI WKH DERYH

7KH IXQFWLRQ KDV DQ LQYHUHQXQFWLRQ

D -

E -

F -

G -

H 1RQH RI WKH DERYH

:KDW LV WKH DYFUDHWDZDRRHDODDQ G DPHVHWZ"HHQ

D S P

E ^S P

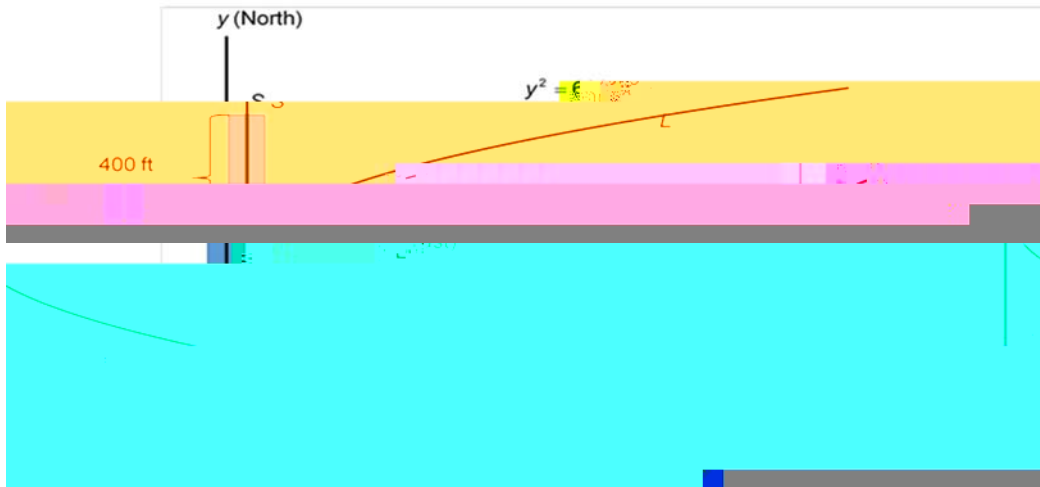
F ^S P

G ^S P

H 1RQH RI WKH DERYH

,I \RX QHHG WKLV GRFXPHQW LQ DQRWKXHQJIRGRDW ISODD VH HPD

\$ UDLOURDG WUDLQ LV PRYLQJ DW DW SHRGGI R7KH PLUID F
 WKH VKDSH R_y WKH S_yUDKERZOD , I W KHL WIXQJ LLQ MXXH HDV
 KRZ IDVW VSKHI WKH G_z ER PRRWLLYHU 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 WDUH VDSHU B DFKLLVXUHQD W K H SRRUWW KR Q E C
 IURP WKH ZHVW 7KH SODQH IURP GWKVI QPULW K RLV W KHL Q
 DLUSRUW 7KH SODQH IURP WKH ZPHWURP WOKHQD LDVSRUW
 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 GURFRUPHDW ISOHDQHW#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 DQRWKXQJIRGRDW ISDQDVH 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

(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 E H WKH FRQWLQXR X³ W² W² L² D² Q² $\int \frac{f(x)}{x} dx$

ZKDW LV WKH Y³ OXH RI

D

E

F

G

H 1RQH RI WKH DERYH

/HW WKH f(x) W² L² R² W² D² Q² G

,I \RX QHHG WKLV GRFXPHQW LQ DQRW KHQ JIRGR DW ISODD VH HPD

/HfWEH D IXQEWLRFQDQW V X^x F^f K^t W^t KDW
:KDW LV WKHc Y'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 YROXPHWDLWKH ERORQDORQH GVEH 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 DQRWKHUJIRGRUW ISODD VH HPD

,I \RX QHHG WKL V 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 DQRW#XHQJIRGRDW ISDQDVH HPD

