What month is your birthday ?
What are the first 2 digits of your address ?
What are the last 2 digits of your zip code ?
What are the last 2 digits of your DeAnza ID number ?

SCORE: ___ / 30 POINTS

NO CALCULATORS ALLOWED

SHOW PROPER ALGEBRAIC WORK AND USE PROPER NOTATION

State the definition of "critical number".   SCORE: ___ / 2 POINTS

(handwritten) a IS A CRITICAL NUMBER OF f IF a IS IN THE DOMAIN OF f, $\frac{1}{2}$ AND $f'(a)=0$ OR $f'(a)$ DOES NOT EXIST $\frac{1}{2}$
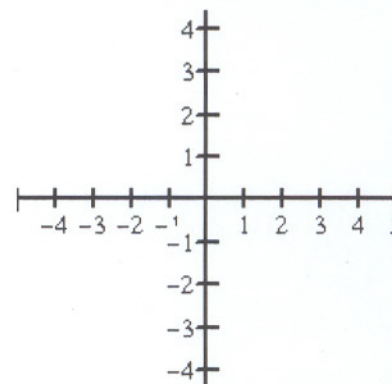
(red ink) $\frac{1}{2}$ SUBTRACT $\frac{1}{2}$ POINT FOR INCORRECT "IF" "AND" "OR" $\frac{1}{2}$ $\frac{1}{2}$

Sketch the graph of a function which satisfies all the following properties, or explain **very briefly** why no such function exists.   SCORE: ___ / 2 POINTS

f is continuous on $[-5, 5]$, f has a local minimum at $x = -1$,

f has a local maximum at $x = -3$, f has a local and global maximum at $x = 2$,

and f has no global minimum on $[-5, 5]$.

(handwritten) NO SUCH f. EXTREME VALUE THEOREM $\frac{1}{2}$ SAYS EVERY $\frac{1}{2}$ CONTINUOUS FUNCTION ON A CLOSED INTERVAL $\frac{1}{2}$ HAS BOTH A GLOBAL MAX & MIN, $\frac{1}{2}$

(graph grid with axes marked from -4 to 4 horizontally and vertically)

Chris is driving **north** along Stelling Road at 24 miles per hour, and Pat is driving **west** along Stevens Creek   SCORE: ___ / 10 POINTS
Boulevard at 45 miles per hour. If Chris is currently 2 miles **south** of the intersection of Stelling Road and Stevens Creek Boulevard, and Pat is currently 1 mile **west** of the intersection, how quickly is the distance between them changing ? Are they getting closer together or farther apart ?

(handwritten work)
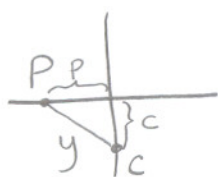
$\dfrac{dc}{dt} = -24\ mi/hr$, $\dfrac{dp}{dt} = +45\ mi/hr$ FIND $\dfrac{dy}{dt}$

WHEN $c = 2\,mi$
$p = 1\,mi$
$y = \sqrt{5}\,mi$

$y^2 = p^2 + c^2$

$2y\dfrac{dy}{dt} = 2p\dfrac{dp}{dt} + 2c\dfrac{dc}{dt}$

$\sqrt{5}\,mi \cdot \dfrac{dy}{dt} = 1\,mi \cdot \dfrac{45\,mi}{hr} + 2\,mi \cdot \left(\dfrac{-24\,mi}{hr}\right)$

$\dfrac{dy}{dt} = \dfrac{-3}{5}\dfrac{mi}{hr}$

(GETTING CLOSER TOGETHER)

Find the global extrema of $f(x) = x^{\frac{2}{5}}(2x-7)$ on the interval $[-1, 3]$.   **SCORE: ___ / 6 POINTS**
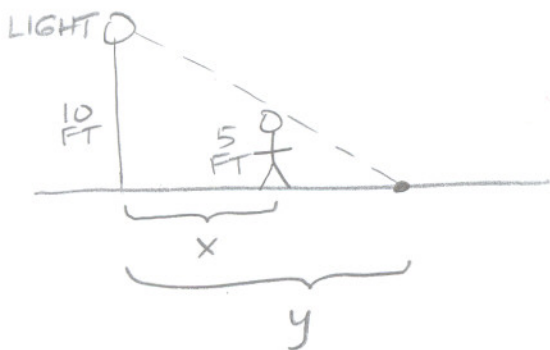
$f(x) = 2x^{\frac{7}{5}} - 7x^{\frac{2}{5}}$

$f'(x) = \frac{14}{5}x^{\frac{2}{5}} - \frac{14}{5}x^{-\frac{3}{5}}$, DNE @ $x = 0 \in [-1, 3]$

$= \frac{14}{5}x^{-\frac{3}{5}}(x-1) = 0$ @ $x = 1$

x	$f(x)$		
-1	-9	←————————— MIN	$\frac{1}{2}$
0	0	←————————— MAX	$\frac{1}{2}$
1	-5		
3	$-3^{\frac{2}{5}} = -\sqrt[5]{9}$		

$\frac{1}{2}$ (for each row)

A street light is mounted at the top of a 10 foot tall pole. A 5 foot tall girl walks in a straight line away from   **SCORE: ___ / 10 POINTS**
the pole at 2 feet per second. How fast is the tip of the girl's shadow moving when she is 20 feet from the pole ?

LIGHT ○
10 FT
5 FT

x

y

$2 \mid \frac{dx}{dt} = 2\,^{ft}/_s$, WANT $\frac{dy}{dt}$ WHEN $x = 20\,ft$

$3 \mid \frac{y-x}{5ft} = \frac{y}{10ft}$

$10y - 10x = 5y$

$y = 2x$

$2 \mid \frac{dy}{dt} = 2\frac{dx}{dt}$

$= 2(2\,^{ft}/_s)$

$= 4\,^{ft}/_s$

$\frac{1}{2}$ $\frac{1}{2}$