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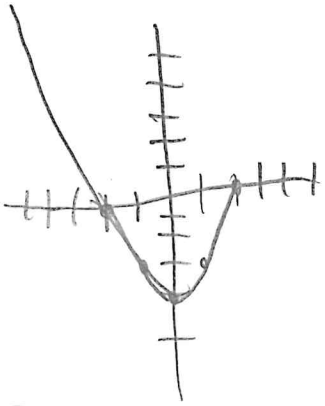
65) $f(x) = \begin{cases} x^2 - 4 & \text{for } x \leq 2 \\ 3x - 4 & \text{for } x > 2 \end{cases}$

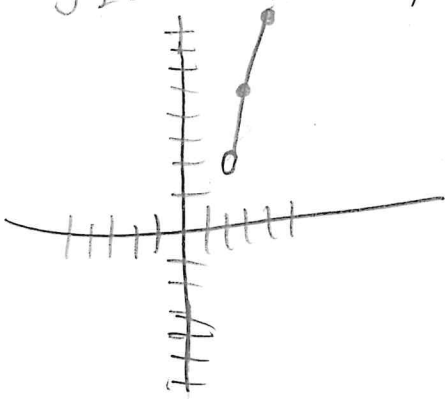
Graph $f(x)$, then determine if $f(x)$ is continuous or not

$f_1(x) = x^2 - 4$, $x \leq 2$



| $x$ | $y$ | $(x, y)$ |
|---|---|---|
| 2 | 0 | (2, 0) |
| 1 | −3 | (1, −3) |
| 0 | −4 | (0, −4) |
| −1 | −3 | (−1, −3) |
| −2 | 0 | (−2, 0) |

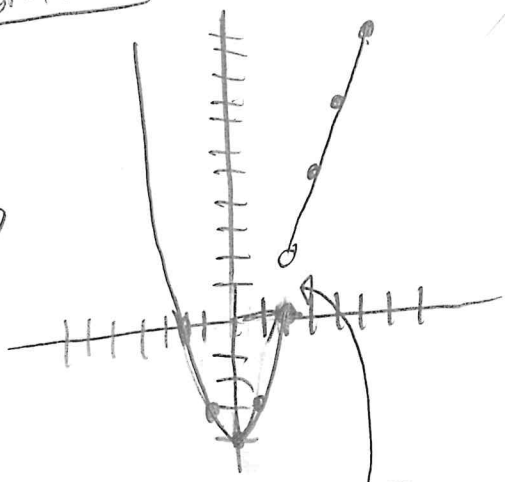
$f_2(x) = 3x - 4$, $x > 2$



| $x$ | $y$ | $(x, y)$ |
|---|---|---|
| 2 | 2 | (2, 2) |
| 3 | 5 | (3, 5) |
| 4 | 8 | (4, 8) |
| 5 | 11 | (5, 11) |
| 6 | 14 | (6, 14) |

$\Rightarrow$

Combine the graphs



Not | Continuous

"Cut" at (2, 0) and (2, 2) when graphing in ALEKS.

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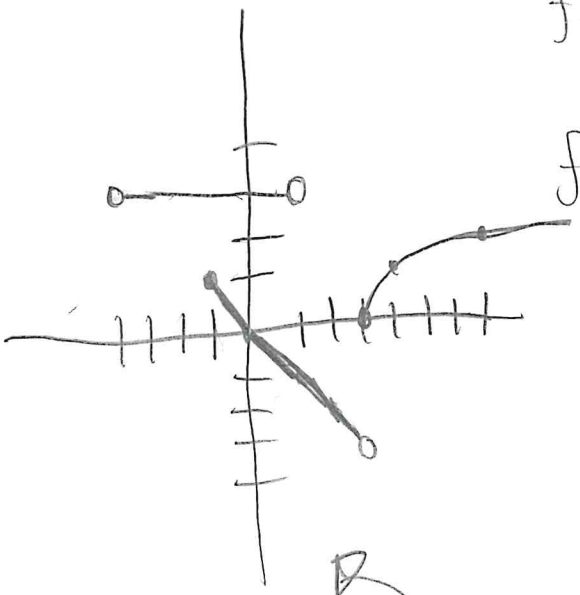
69) $f(x) = \begin{cases} 3 & -4 < x < 1 \\ -x & -1 \le x < 3 \\ \sqrt{x-3} & x \ge 3 \end{cases}$

$f_1(x) = 3$ is a straight line, don't need a table.



$f_2(x) = -x$ for $-1 \le x < 3$

| x | y | (x, y) |
|---|---|---|
| -1 | 1 | (-1, 1) |
| 0 | 0 | (0, 0) |
| 1 | -1 | (1, -1) |
| 2 | -2 | (2, -2) |
| 3 | -3 | (3, -3) |

$f_3(x) = \sqrt{x-3}$ for $x \ge 3$

| x | y | (x, y) |
|---|---|---|
| 3 | 0 | (3, 0) |
| 4 | 1 | (4, 1) |
| 7 | 2 | (7, 2) |
| 12 | 3 | (12, 3) |

* for table of square root functions, such as $f(x) = \sqrt{x-3}$, might be easier to pick y-values and solve for x, instead of picking x-values and solving for y.

$f(x) = \sqrt{x-3}$

$y = \sqrt{x-3}$

$2 = \sqrt{x-3}$

$4 = x-3$

$7 = x$

Domain: $(-4, \infty)$

Range: $(-3, \infty)$

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Given $3x - 4y = 8$,

a) Find an equation of a line parallel to $3x - 4y = 8$ and passes through $(-6, 3)$.

b) Find an equation of a line perpendicular to $3x - 4y = 8$ and passes through $(-6, 3)$

Standard form
$Ax + By = C$

Point-slope form
$y = mx + b$

$3x - 4y = 8$

$-4y = -3x + 8$

$y = \frac{-3}{-4}x + \frac{8}{-4}$

$y = \frac{3}{4}x + -2$,

$m = 3/4$, $-2 = b$

for parallel

a) $m = \frac{3}{4}$, plug in $(-6, 3)$ & solve for b

$3 = \frac{3}{4}(-6) + b$

$3 = \frac{-18}{4} + b$

$12 = -18 + 4b$

$30 = 4b$

$\frac{30}{4} = b$

$\frac{15}{2} = b$

Answer:

$y = \frac{3}{4}x + \frac{15}{2}$

b) $m = \frac{-4}{3}$ for perpendicular, then plug in $(-6, 3)$

$3 = \frac{-4}{3}(-6) + b$

$3 = \frac{24}{3} + b$

$3 = 8 + b$

$-5 = b$,

Answer:

$y = \frac{-4}{3}x + -5$

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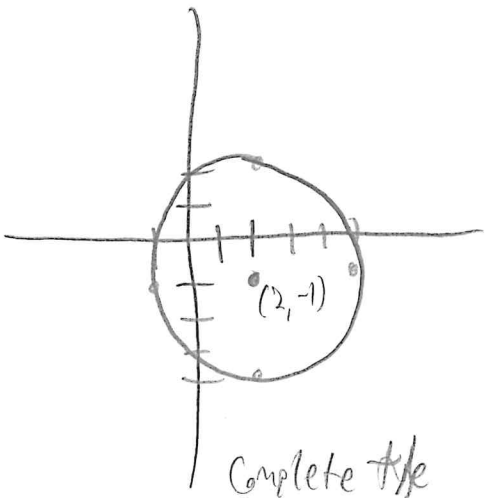
$x^2 + y^2 - 4x + 2y - 4 = 0$

Write the equation in the form

$(x-h)^2 + (y-k)^2 = r^2$,

where $r$ = radius and $(h,k)$ = center,

then graph it.




$x^2 - 4x \_\_\_ + y^2 + 2y + \_\_\_ = 4$

Complete the Square

$x^2 - 4x + 4 + y^2 + 2y + 1 = 4 + 4 + 1$

x

$-4 \div 2 = -2$

$(-2)^2 = 4$

$(x-2)^2 + (y+1)^2 = 9$

$(x-2)^2 + (y-(-1))^2 = 3^2$

$(x-h)^2 + (y-k)^2 = r^2$

$h = 2, k = -1, r = 3$

center: $(2, -1)$

y

$2 \div 2 = 1$

$1^2 = 1$

---

Complete the Square.

Need $x^2 + bx + c$, given $x^2 + bx$, to solve, calculate

$\left(\frac{b}{2}\right)^2 = c$, and add $\left(\frac{b}{2}\right)^2$ to other side.