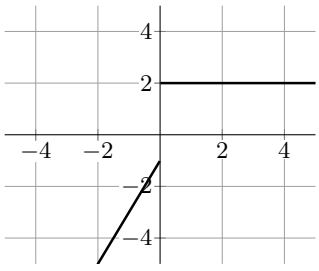
AP Calc. AB - Exam 2 Practice Problems
Exam date: August 24 Name: _____

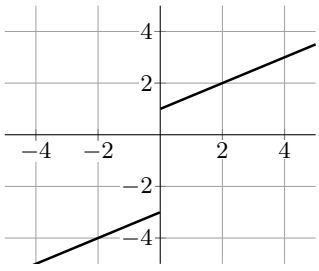
1. For each circle, find its (i) center, (ii) radius, and (iii) equation for the (left/right/top/bottom) specified semicircle.
   (a) $x^2 - 12x + y^2 - 4y = -15$
   (b) $x^2 + y^2 + 6x + 6y = 31$
   (c) $4x + y^2 + x^2 = 45$

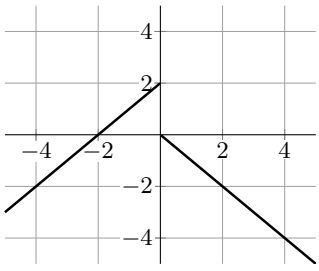
2. Sketch each solution set:
   (a) $\{(x, y) \mid |x| < 4,\ y > 3\}$
   (b) $\{(x, y) \mid x^2 + (y-1)^2 \leq 16\}$
   (c) $\{(x, y) \mid y \geq \frac{2}{3}x - 2\}$
   (d) $\{(x, y) \mid x^2 - 2x + 1 \geq y,\ y > -4\}$
   (e) $\{(x, y) \mid y \leq x^2 + 2x - 3,\ |x| < 4\}$
   (f) $\{(x, y) \mid y \leq \sqrt{x},\ y \geq 0,\ x < 3\}$

3. Evaluate:
   (a) $\tan\left(\frac{2\pi}{3}\right)$
   (b) $\csc\left(\frac{\pi}{2}\right)$
   (c) $\sin\left(-\frac{\pi}{4}\right)$
   (d) $\cot\left(\frac{5\pi}{6}\right)$
   (e) $\cos(3\pi)$
   (f) $\sec\left(-\frac{2\pi}{3}\right)$
   (g) $\sin\left(\frac{3\pi}{4}\right)$
   (h) $\tan(-\pi)$
   (i) $\cos\left(\frac{7\pi}{2}\right)$
   (j) $\csc\left(-\frac{\pi}{3}\right)$
   (k) $\sec\left(\frac{\pi}{4}\right)$
   (l) $\cot\left(\frac{\pi}{3}\right)$

4. This question has multiple sections: (a)-(d), sketch the piecewise-defined function; (e)-(h), rewrite each function as a piecewise one; (i)-(k), find piecewise formulas for each graph.
   (a) $f(x) = \begin{cases} -1 & \text{if } x < -1 \\ 0 & \text{if } -1 \leq x \leq 0 \\ 1 & \text{if } 0 < x \leq 1 \\ 2 & \text{if } x > 1 \end{cases}$
   (b) $f(x) = \begin{cases} x + 2 & \text{if } x < 1 \\ -x^2 + 4 & \text{if } x \geq 1 \end{cases}$
   (c) $f(x) = \begin{cases} 0 & \text{if } x < 0 \\ x & \text{if } 0 \leq x < 3 \\ -2x + 9 & \text{if } x > 3 \end{cases}$
   (d) $f(x) = \begin{cases} (x+1)^2 - 3 & \text{if } x < 0 \\ -\frac{1}{2}x - 2 & \text{if } 0 \leq x < 2 \\ 2x - 7 & \text{if } x \geq 2 \end{cases}$
   (e) $f(x) = |1 - 2x|$
   (f) $f(x) = -|3x + 2| + 4$
   (g) $f(x) = -|-x + 2| - 1$
   (h) $f(x) = |x| - |x + 1|$

(i)


(j)


(k)


5. For each of the following functions, evaluate the difference quotient:

$$\frac{f(x+h)-f(x)}{h}$$

(a) $f(x) = x^2 + 3$ (b) $f(x) = 2x^3 + 7$ (c) $f(x) = 4x^2 + 2x + 9$