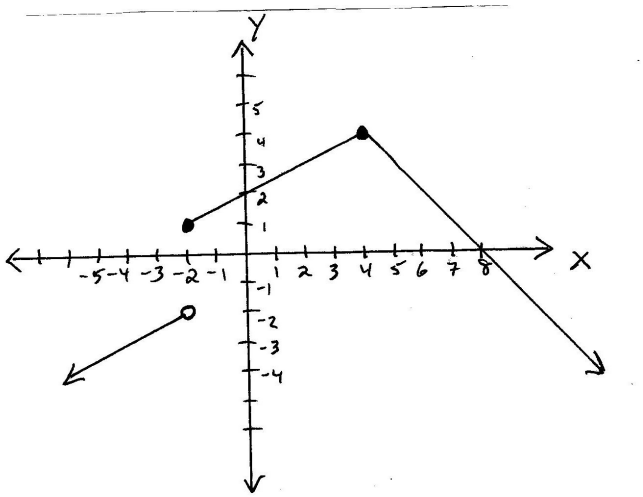
Practice questions for Exam 1, Math 1351-011, Fall 2007

September 17, 2007

1. Solve for x:
   (a) $|3x - 5| = 4$
   (b) $9x + 3x^2 \leq 0$
   (c) $|2 - 3x| \leq 6$
2. Find an equation for the line that passes through the point $P(1, 2)$ and is parallel to the line that passes through the points $Q(1, 4)$ and $R(2, 7)$.
   What is the midpoint of $Q(1, 4)$ and $R(2, 7)$
3. Find an equation for the line that is perpendicular to the line passing through the points $Q(1, 4)$ and $R(2, 7)$ and which passes through the midpoint of the line QR.
4. Find the radius and center of the circle
   $x^2 - 6x + y^2 + 4y = -12$
   Graph the circle.
5. Which of the following lines are parallel or perpendicular?
   (a) $y - 2x + 7$
   (b) $2x + 2y - 4 = 0$
   (c) $y + 2 = 2(x - 4)$
   (d) $x + 2y - 6 = 0$
6. Given that $f(s) = s^2 - 1$ and $g(t) = \frac{3t}{t-1}$,
   (a) What is the domain of f?
   (b) What is the domain of g?
   (c) Find $f \circ g$.
   (d) Find $g \circ f$.
   (e) Evaluate and simplify $\frac{f(x+h)-f(x)}{h}$
7. Given $f(t) = 2\cos(t) + 3$ and $g(t) = \sin^{-1}(t)$,
   evaluate $g(f(\pi))$.

8. For each of the following functions, does the inverse exist? If so, find it; graph the function and its inverse.
   (a) $f(x) = t^2 + 3x + 1$
   (b) $g(t) = \tan(t)$ on $(\frac{-\pi}{2}, \frac{\pi}{2})$
   (c) $h(s) = 4s + 3$
9. Simplify $\tan(\sin^{-1} x)$

10. The function $f(x)$ is given by the graph to the right. For each of the following, state if it exists. If it does exist, find its value. If it does not exist, state why not.



   (a) $\lim_{x\to 2^+} f(x)$
   (b) $\lim_{x\to 2^-} f(x)$
   (c) $\lim_{x\to 2} f(x)$
   (d) $\lim_{x\to 4^+} f(x)$
   (e) $\lim_{x\to 4^-} f(x)$
   (f) $\lim_{x\to 4} f(x)$
   (g) Is f continuous at $x = 4$?
   (h) Is f continuous at $x = -2$?
   (i) Is f continuous at $x = 0$?
   (j) Is f continuous on $(-2, 8)$?
   (k) Is f continuous on $[-2, 4]$?

11. Algebraically evaluate each of the following limits:

$$\lim_{x\to 4} \frac{(x^2 - 3x - 4)}{x - 4}$$

$$\lim_{x\to 0} \frac{\sin(3x)}{2x}$$

$$\lim_{x\to 0} \frac{\sin^2 x}{x^2}$$

$$\lim_{x\to 0} \frac{2\sin 2x}{x\cos 3x}$$

12. Compute using the squeeze rule:

$$\lim_{x\to 0} x\sin(\frac{1}{x})$$

13. Identify the intervals of continuity of the following functions:
   (a) $f(x) = \frac{x-1}{2+\cos x}$
   (b) $g(x) = \frac{2x-x^2}{x^2-4}$
14. Show that the function $f(x) = 2x^3 - x + 1$ has at least one root on the interval $(-1, 1)$.
15. Show that the equation $\cos x - \sin x = x$ has at least one solution on the interval $(0, \frac{\pi}{2})$.
16. All homework problems should be considered example problems as well.