# Fall 2007 Math 151

**Week in Review 2**

*courtesy: Amy Austin*

(covering sections 1.3, 2.2, 2.3)

## Section 1.3

1. Find a cartesian equation for the following parametric curves. Sketch the curve.

   a.) $x = 2t - 1$, $y = 2 - t$, $-3 \le t \le 3$

   b.) $x = 2\sin\theta$, $y = 3\cos\theta$, $0 \le \theta \le \pi$

   c.) $\mathbf{r(t)} =< 2 + \sin t, 3 + \cos t >$, $0 \le t \le 2\pi$ Give the direction of increasing $t$.

   d.) $x = \sqrt{t}$, $y = 1 - t$

   e.) $x = \cos t$, $y = \sec(t)$

2. An object is moving in the $xy$-plane and the position of the object after $t$ seconds is given by $\mathbf{r(t)} = \langle t + 1, t^2 + 2\rangle$.

   a.) Find the position of the object at time $t = 2$.

   b.) At what time does the object reach the point $(4, 11)$?

   c.) Does the object pass through the point $(9, 20)$?

   d.) Find a cartesian equation for the path of the object.

3. Find parametric equations for the line that passes thru the points $(1, 3)$ and $(-5, 7)$.

4. Determine whether the following lines are parallel or perpendicular. If they are not parallel, find the point of intersection.

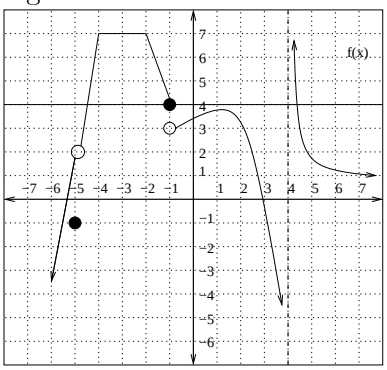
   L1: $\mathbf{r(t)} = (-4 + 2t)\mathbf{i} + (5 + t)\mathbf{j}$

   L2: $\mathbf{r(t)} = (2 + 3t)\mathbf{i} + (4 - 6t)\mathbf{j}$

5. Find parametric equations for the line that passes thru the point (1,2) and is parallel to the line $x = 1 + 2t$, $y = 5 - 4t$.

## Section 2.2

6. Use the graph of $f(x)$ below to compute the following limits:




   a) $\lim_{x\to -1^-} f(x)$ b) $\lim_{x\to -1^+} f(x)$

   c) $\lim_{x\to -1} f(x)$ d) $\lim_{x\to -5} f(x)$

   e) $\lim_{x\to 4^+} f(x)$ f.) $\lim_{x\to -3} f(x)$

7. $\lim_{x\to 3^-} \dfrac{x-5}{x^2-9}$

8. Find all holes and vertical asymptote(s) on the graph of the function $f(x) = \dfrac{x-1}{x^2-1}$ and determine the behavior of the function near the vertical asymptote(s).

## Section 2.3

Compute the exact value of the following limits. If the limit does not exist, support your answer by evaluating left and right hand limits.

9. $\lim_{x\to 1}(4x^3 - 3x + 1)$

10. $\lim_{x\to -5} \dfrac{x^2 + 5x}{x + 5}$

11. $\lim_{x\to 2} \dfrac{x - \sqrt{3x-2}}{x^2 - 4}$

12. $\lim_{h\to 0} \dfrac{(3+h)^{-1} - 3^{-1}}{h}$

13. $\lim_{x\to 1} \dfrac{x-4}{x-1}$

14. $\lim_{x\to 3} f(x)$, where $f(x) = \begin{cases} x + 5 & \text{if } x \le 3 \\ x^3 - 3 & \text{if } x > 3 \end{cases}$

15. $\lim_{x\to 2} \dfrac{x^2 - 4}{|\,x - 2\,|}$

16. $\lim_{x \to 0^-} \left( \frac{1}{x} - \frac{1}{|x|} \right)$

17. Sketch the graph of $f(x) = x - |x|$ and give all $x$ coordinates where the limit does not exist.

18. $\lim_{x \to 1} f(x)$ if it is known that $4x \leq f(x) \leq x + 3$ for all $x$ in $[0, 2]$.