Math 131 - February 26, 2016
Solutions

Warm-up Problems

1. Let $f(t) = t^3 - 6t^2 + 9t$. Fill out the table:

t	-1	0	1	2	3	4	5	6
$f(t)$	-16	0	4	2	0	4	20	54

2. Let $f(t) = t^3 - 9t^2 + 15t$. Fill out the table:

t	-1	0	1	2	3	4	5	6	7
$f(t)$	-26	0	7	2	-9	-20	-25	-18	7

Lecture Problems

3. (a) $y = (x+3)^3(x-4)^2$. $y' = (x+3)^3(x-4)^2\left(\frac{3}{x+3} + \frac{2}{x-4}\right)$

   (b) $y = \dfrac{x^5}{(1-10x)\sqrt{x^2+2}}$. $y' = \frac{x^5}{(1-10x)\sqrt{x^2+2}}\left(\frac{5}{x} + \frac{10}{1-10x} - \frac{x}{x^2+2}\right)$

4. Let $f(t) = t^3 - 9t^2 + 15t$ be your position at time t.

   (a) $f'(t) = 3t^2 - 18t + 15 = 3(t-1)(t-5)$

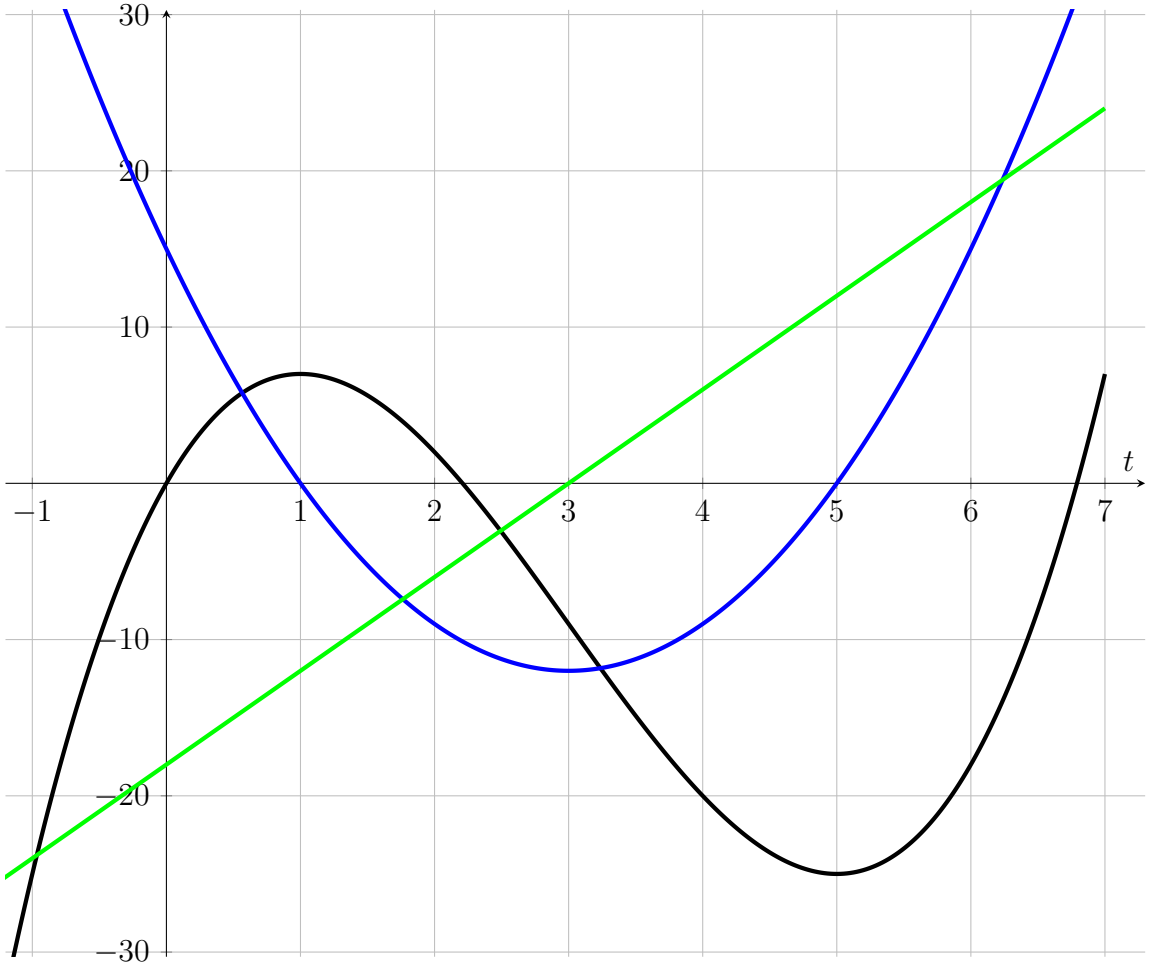
   (b) $f''(t) = 6t - 18$

   (c) Find all t values where $f'(t) = 0$. **Solution:** $t = 1$ and $t = 5$.

   (d) Find all t values where $f''(t) = 0$. **Solution:** $t = 3$.

   (e) Describe what is happening with whatever it is that is moving.
   Solution: The particle starts at position 0 ($t = 0$) and is moving to the right. It moves to the right until $t = 1$ where it stops, turns around and moves to the left until $t = 5$. At the point, it stops and moves to the right.

   (f) Plot a graph of f, f' and f''. Describe the motion of the particle using the graph.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