# 5.3 day 4

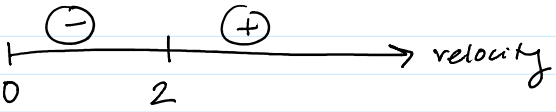
Monday, October 9, 2017 8:13 PM

pg. 220 # 25, 26, 28-30, 39, 40, 55, 56, 58

25. $x(t) = t^2 - 4t + 3$

a. $x'(t) = v(t) = 2t - 4$

b. $x''(t) = v'(t) = a(t) = 2$

c. 


$x(0) = 3$ $x(2) = -1$

The particle begins at a position of 3. Then, it travels left slowing down ($v<0$ and $a>0$) to a position of $-1$ at 2 seconds. Then, the particle moves right speeding up ($v>0$ and $a>0$).

26. $x(t) = 6 - 2t - t^2$

a. $x'(t) = v(t) = -2 - 2t$

b. $x''(t) = v'(t) = a(t) = -2$

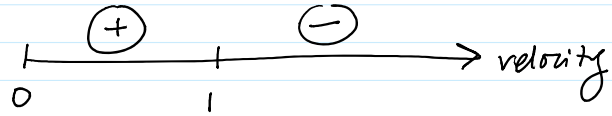

$x(0) = 6$

The particle begins at 6 and moves left speeding up ($v<0$ and $a<0$).

28. $x(t) = 3t^2 - 2t^3$

a. $x'(t) = v(t) = 6t - 6t^2$

b. $x''(t) = a(t) = 6 - 12t$

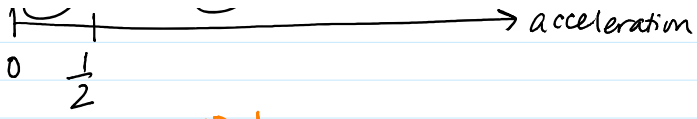
c 


$6t - 6t^2 = 0$

$6t(1-t) = 0$

$t = 0, 1$


$6 - 12t = 0$




$6 - 12t = 0$

$x(0) = 0$ $x(1) = 1$

The particle begins at a position of 0. It moves right speeding up ($v > 0$ and $a > 0$). At $t = 1/2$, the particle keeps moving right, but slows down ($v > 0$ and $a < 0$). At $t = 1$, the particle stops at a position of 1 and changes direction. Then, the particle moves left speeding up ($v < 0$ and $a < 0$).

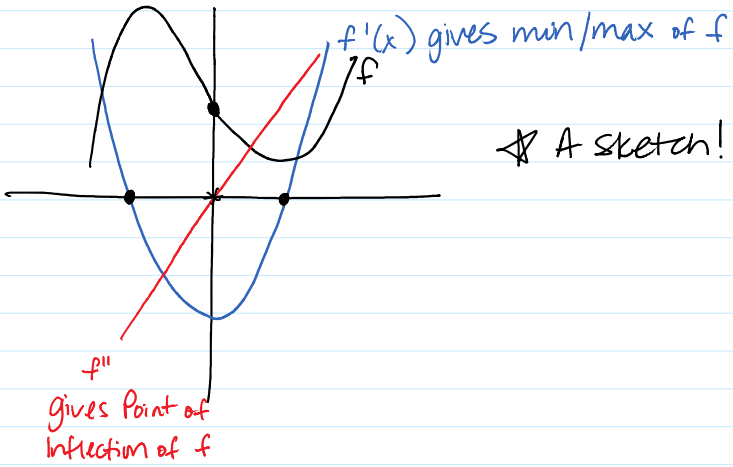
29. a. velocity $= 0$ at a min or max of $x(t)$
around $t = 2, 6, 9.5$

b. acceleration $= 0$ at a point of inflection of $x(t)$
around $t = 4, 8, 11$

30. a. around $t = -0.5, 3.5, 12, 16$

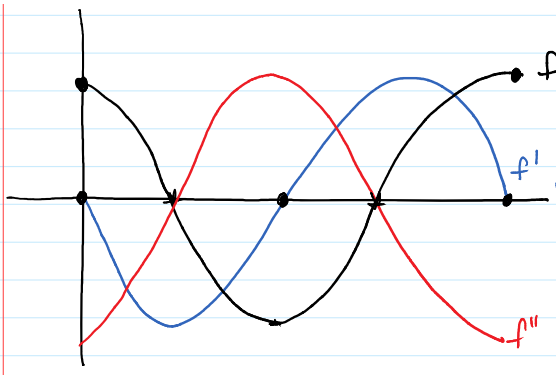
b. around $t = 1.5, 5.5, 7, 10, 13.5$

39.




☆ A sketch!

40.




A sketch!

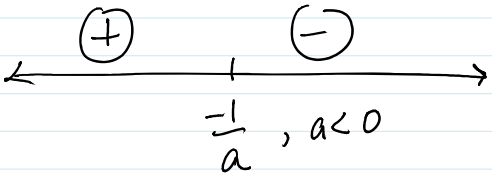
55. $y = ax^3 + 3x^2 + 4x + 5$

$y' = 3ax^2 + 6x + 4$

$y'' = 6ax + 6 \quad = 0$

$6ax = -6$

$x = \frac{-6}{6a} = \frac{-1}{a}$ remember, $a < 0$!




$\frac{-1}{a}$, $a < 0$

56. E $f'$ and $f''$ need to change signs to declare a min, max, or point of inflection

58. A