ASSIGNMENT 28

1. $f''(a) > 0 \rightarrow f$ is CU near $a \rightarrow$ I not true
   $f''(a) \neq 0 \rightarrow a$ is not an infl. point $\rightarrow$ II false
   $f'(a) = 0 \rightarrow a$ is a c.p.; since $f''(a) > 0$
   f is CU, so a is a local min.

(D)

2. I true, by def. of a critical point
   II true, since $f'(a)$ = slope at a
   III not true (consider $a = 0$ for $f(x) = x^3$)

(E)

3. **FALSE**; consider $f(x) = (x-5)^3$, ie, the graph of x^3 moved 5 units to the right; then $f'(5) = 0$, but $x = 5$ is not a local extreme

4. **TRUE**; Fermat's theorem

5. **FALSE**; $f(x)$ is continuous for all real numbers, and thus on $[-2, 7]$. By the Extreme Value Theorem, $f(x)$ must have absolute max. and absolute min. on $[-2, 7]$

6. **TRUE** (exp. function is stronger than any power of x at ∞; as well, $x^3 \rightarrow \infty$ as $x \rightarrow \infty$ so the leading behaviour in the denominator is x^3)

7. $m^* = -2$ is an equilibrium (check it)

FALSE $f(x) = 2x^2 + 6x + 2 \rightarrow f'(x) = 4x + 6$

$f'(m^*) = 4(-2) + 6 = -2 \rightarrow |f'(m^*)| > 1$

So unstable

8. FALSE $f'(x)$ is a polynomial of degree 3, so can have at most 3 roots (ie at most 3 critical points)