AP CALCULUS PROBLEM SET #8 CURVE II ANSWER KEY

1. a) Increasing on $[0, \infty)$

   b) Relative min. @ $(0, -1)$, no relative max.

   c) Concave up on

   $(-\infty, -1)$, $\left(-\sqrt{\frac{1}{5}}, \sqrt{\frac{1}{5}} \right)$, $(1, \infty)$

2. a) Abs. Max. : $e^{2\pi}$

   Abs. Min. : $-\dfrac{e^{5\pi/4}}{\sqrt{2}}$

   b) increasing on $\left[0, \dfrac{\pi}{4} \right], \left[\dfrac{5\pi}{4}, 2\pi \right]$

   c) $x = \pi$

3. a) Relative max. @ $x = -2$
   b) Concave down and decreasing on $(-2, -1)$
      and $(1, 3)$
   c) inflection points at $x = -1$ and 3

   (d) $f(x) = 3 + \displaystyle\int_1^x f'(t)\, dt$

   $f(4) = 3 + \displaystyle\int_1^4 f'(t)\, dt = 3 + (-12) = -9$

   $f(-2) = 3 + \displaystyle\int_1^{-2} f'(t)\, dt = 3 - \int_{-2}^1 f'(t)\, dt$
   $= 3 - (-9) = 12$

4. a) $y = \dfrac{2}{e^2} - \dfrac{1}{e^4}\left(x - e^2 \right)$

   b) $x = e$, relative maximum

   c) $x = e^{3/2}$

   d) $\displaystyle\lim_{x \to 0^+} \dfrac{\ln x}{x} = -\infty$

5. a) $k = -2$, $p = 2$

   b) f is increasing on all real numbers,
      $x \neq 1$

   c) $(1, 1)$

6. a) $h'(x) = 0$ at $x = \pm\sqrt{2}$
      Local minima at $x = -\sqrt{2}$ and $\sqrt{2}$

   b) Concave up for all x, $x \neq 0$

   c) $y = \dfrac{7}{2}x - 17$

   d) below $h(x)$

7. a) $x = 6$, local minimum

   b) Absolute min @ $x = -8$

   c) Concave down and increasing on $(0, 1)$ and
      $(3, 4)$

   d) $g'(3) = 3\left[f(3) \right]^2 f'(3) = 75$