

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. : $e^{2\pi}$

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

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

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

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

$$\begin{aligned} f(-2) &= 3 + \int_1^{-2} f'(t) dt = 3 - \int_{-2}^1 f'(t) dt \\ &= 3 - (-9) = 12 \end{aligned}$$

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

b) $x = e$, relative maximum

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

d) $\lim_{x \rightarrow 0^+} \frac{\ln x}{x} = -\infty$

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

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) $g'(3) = 3[f(3)]^2 f'(3) = 75$