Summary of Curve Sketching

Solutions:

1. $f(x) = -x^3 + 3x - 2$

   Domain: $(-\infty, \infty)$

   Symmetry: none

   x-intercepts: $(-2, 0)$, $(1, 0)$

   y-intercept: $(0, -2)$

   Asymptotes: none

   $f'(x) = -3x^2 + 3$

   f is increasing on $(-1, 1)$

   f is decreasing on $(-\infty, -1) \cup (1, \infty)$

   $(-1, -4)$ is a local minimum

   $(1, 0)$ is a local maximum

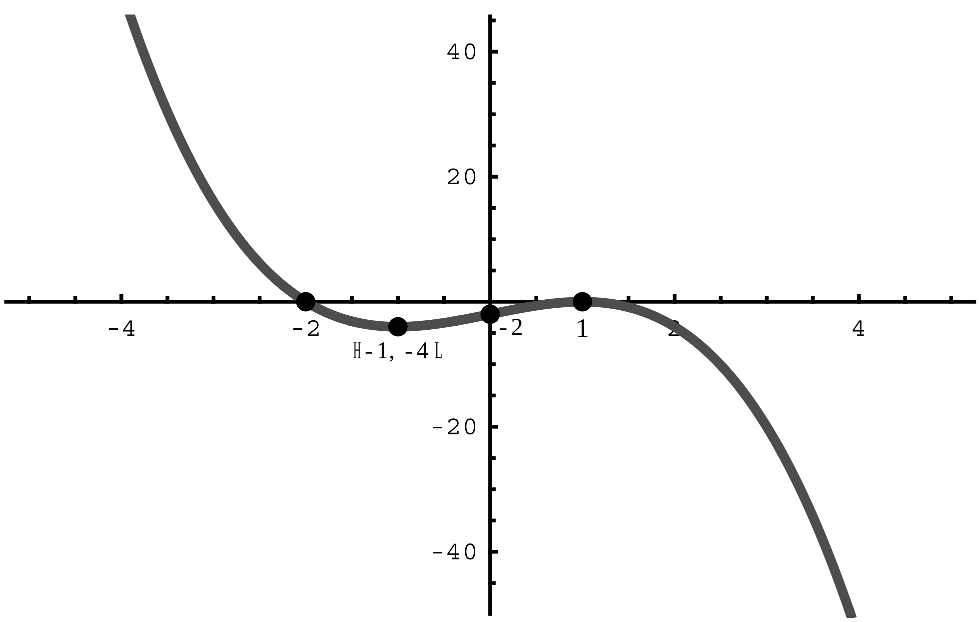
   $f''(x) = -6x$

   f is concave up on $(-\infty, 0)$

   f is concave down on $(0, \infty)$

   $(0, -2)$ is an inflection point

$f(x) = -x^3 + 3x - 2$



2. $g(x) = x^{\frac{5}{3}} + 5x^{\frac{2}{3}}$

   Domain: $(-\infty, \infty)$

   Symmetry: none

   x-intercepts: $(0, 0)$, $(5, 0)$

   y-intercept: $(0, 0)$

   Asymptotes: none

3. $h(x) = \sin x + \cos x$

Domain: $\left[-\frac{\pi}{2}, \pi\right]$

Symmetry: none

x-intercepts: $\left(-\frac{\pi}{4}, 0\right)$, $\left(\frac{3\pi}{4}, 0\right)$

y-intercept: $(0, 1)$

Asymptotoes: none

$h'(x) = \cos x - \sin x$

h is increasing on $\left[-\frac{\pi}{2}, \frac{\pi}{4}\right)$

h is decreasing on $\left(\frac{\pi}{4}, \pi\right]$

$\left(\frac{\pi}{4}, \sqrt{2}\right)$ is a local maximum

$h''(x) = -\sin x - \cos x$

h is concave up on $\left[-\frac{\pi}{2}, -\frac{\pi}{4}\right) \cup \left(\frac{3\pi}{4}, \pi\right]$

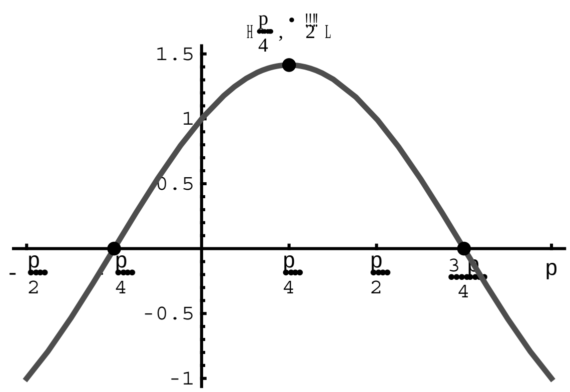
h is concave down on $\left(-\frac{\pi}{4}, \frac{3\pi}{4}\right)$

$\left(-\frac{\pi}{4}, 0\right)$, $\left(\frac{3\pi}{4}, 0\right)$ are inflection points

$\left(\frac{\pi}{4}, \sqrt{2}\right)$ is the absolute maximum

$\left(-\frac{\pi}{2}, -1\right)$ and $(\pi, -1)$ are the absolute minima

$h(x) = \sin x + \cos x$



4. $f(x) = \frac{-x^2+x+2}{(x-1)^2}$

Domain: $(-\infty, 1) \cup (1, \infty)$

Symmetry: none

x-intercepts: $(-1, 0)$, $(2, 0)$

y-intercept: $(0, 2)$

vertical asymptote: $x = 1$

horizontal asymptote: $y = -1$

$f'(x) = \frac{x-5}{(x-1)^3}$

f is increasing on $(-\infty, 1) \cup (5, \infty)$

f is decreasing on $(1, 5)$

$\left(5, -\frac{9}{8}\right)$ is a local minimum

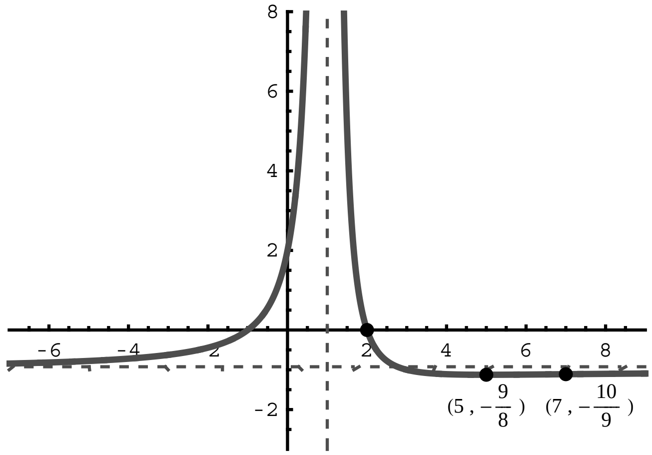
$f''(x) = \frac{-2x+14}{(x-1)^4}$

f is concave up on $(-\infty, 1) \cup (1, 7)$

f is concave down on $(7, \infty)$

$\left(7, -\frac{10}{9}\right)$ is an inflection point

$f(x) = \frac{-x^2+x+2}{(x-1)^2}$



5. Domain: $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$
   Symmetry: origin
   x-intercept: $(0, 0)$
   y-intercept: $(0, 0)$
   vertical asymptotes: $x = -2$, $x = 2$
   slant asymptote: $y = \frac{x}{2}$

$y' = \frac{2x^4 - 24x^2}{(2x^2 - 8)^2}$

y is increasing on $\left(-\infty, -2\sqrt{3}\right) \cup \left(2\sqrt{3}, \infty\right)$

y is decreasing on $\left(-2\sqrt{3}, -2\right) \cup (-2, 2) \cup \left(2, 2\sqrt{3}\right)$

$\left(-2\sqrt{3}, -2.6\right)$ is a local maximum

$\left(2\sqrt{3}, 2.6\right)$ is a local minimum

$y'' = \frac{8x(4x^2 + 48)}{(2x^2 - 8)^3}$

y is concave up on $(-2, 0) \cup (2, \infty)$

y is concave down on $(-\infty, -2) \cup (0, 2)$

$(0, 0)$ is an inflection point

$y = \frac{x^3}{2x^2 - 8}$