8.

20.

$\boxed{\text{Absolute Max: } \left(\frac{\pi}{2}, 1\right)}$

24.

$\boxed{\text{Absolute Min at } (0,0)}$

12. a.

b.

30. $f(x) = x^3 + 6x^2 - 15x$

$f'(x) = 3x^2 + 12x - 15$

$0 = 3x^2 + 12x - 15$

$= (x-1)(x+5)$

$\boxed{x = -5, 1}$

14. a.

b.

34. $0 = |3t - 4|$

$0 = 3t - 4$

$\boxed{t = \frac{4}{3}}$

16.

Absolute Max at
$\left(-2, \frac{8}{3}\right)$

36. $h(p) = \frac{p-1}{p^2+4}$

$h'(p) = \frac{(p^2+4)(1) - (p-1)(2p)}{(p^2+4)^2}$

$0 = p^2 - 2p - 4$

$\boxed{p = \frac{2 \pm \sqrt{20}}{2}}$

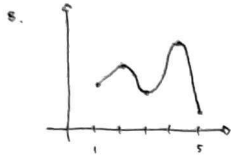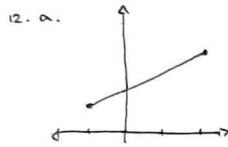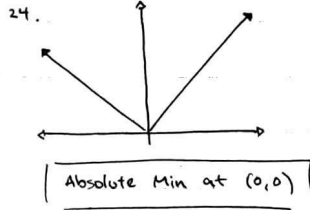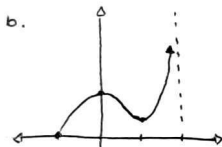**40.** $g(\theta) = 4\theta - \tan\theta$

$g'(\theta) = 4 - \sec^2\theta$

$= 4 - \frac{1}{\cos^2\theta}$

$0 = \cos^2\theta$

$\boxed{\theta = \frac{\pi}{2} + \pi K}$

42. $g(x) = \sqrt{1-x^2}$

$g'(x) = \frac{1}{2}(1-x^2)^{-1/2}(2x)$

$= \frac{2x}{2\sqrt{1-x^2}}$

$= \frac{x}{\sqrt{1-x^2}}$
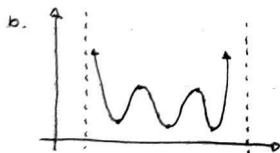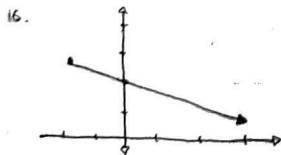
$\boxed{x = 0, \pm 1}$

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

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

$0 = x^2 - x + 1 - 2x^2 + x$

$= -x^2 + 1$

$x = \pm 1$

cp	$f(x)$
-1	$-\frac{1}{3}$
1	1

$\boxed{\begin{array}{l}\text{Absolute Max: } (1,1) \\ \text{Absolute Min: } \left(-1, -\frac{1}{3}\right)\end{array}}$

53. $f(t) = t - \sqrt[3]{t}$

$$f'(t) = 1 - \frac{1}{3} t^{-2/3}$$

$$= 1 - \frac{1}{3t^{2/3}}$$

$3t^{2/3} = 0 \qquad 3t^{2/3} = 1$

$t = 0 \qquad t^{2/3} = \frac{1}{3}$

$\sqrt[3]{t^2} = \frac{1}{3}$

cp	$f(t)$
$-\frac{1}{\sqrt{27}}$	0.3849
0	0
$\frac{1}{\sqrt{27}}$	-0.3849

$t^2 = \frac{1}{27}$

$t = \pm \frac{1}{\sqrt{27}}$

Absolute Max: ~~($\frac{1}{\sqrt{27}}$, 0.3849)~~ (4, 2.413)

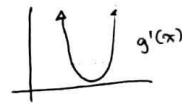Absolute Min: $\left(\frac{1}{\sqrt{27}}, -0.3849 \right)$

68. $g(x) = (x-5)^3 + 2$

$$g'(x) = 3(x-5)^2$$

$$0 = 3(x-5)^2$$

$x = 5 \checkmark$ critical point.

Local Extrama exist when
$g'(x)$ change sign)

$g'(x)$

↳ doesn't ever change signs.

55. $f(t) = 2\cos t + \sin 2t$

$$f'(t) = -2\sin t + 2\cos 2t$$

$0 = -2\sin t + 2\cos 2t$

$\sin t = \cos 2t$

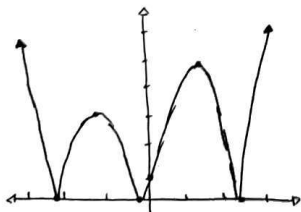$t = \frac{\pi}{6}$

cp	$f(t)$
$\frac{\pi}{6}$	2.598

Absolute Max: $\left(\frac{\pi}{6}, 2.598 \right)$

Absolute Min: $\left(\frac{\pi}{2}, 0 \right)$

58.

$x = -2.1, -1.3, -0.2, 1.3, 2.3$