1. $g(x) = \sqrt{5+6x}$

$= (5+6x)^{-1/2}$

(a) $g'(x) = \frac{1}{2}(5+6x)^{-1/2} \cdot 6$

$= 3(5+6x)^{-1/2} = \frac{3}{\sqrt{5+6x}}$

(b) Domain, $g(x)$

$5 + 6x \geq 0$

$5 + 6x \geq 0$

$6x \geq -5$

$x \geq -\frac{5}{6}$

$= [-5/6, \infty)$

(c) Domain $g'(x)$

$\sqrt{5+6x} \neq 0 \qquad 5+6x \geq 0$

$\sqrt{5+6x} \neq 0 \qquad 5+6x \geq 0$

$5+6x \neq 0 \qquad 6x \geq -5$

$x \neq -\frac{5}{6} \qquad x \geq -\frac{5}{6}$

$= (-5/6, \infty)$

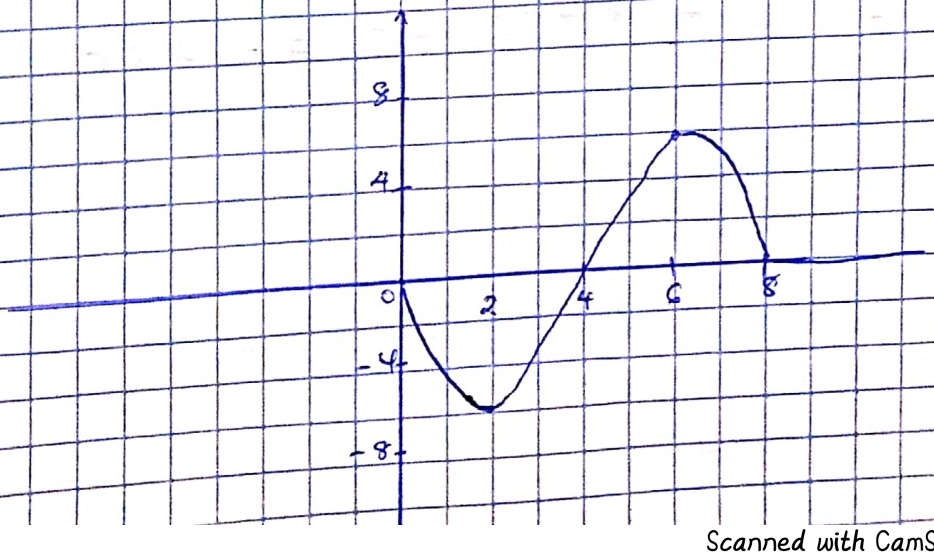
2 (a) Increasing = $(2, 6)$

Decreasing = $(0, 2) \cup (6, 8)$

(b) Local maximum at $x = 6$

Local minimum at $x = 2$

(c)



(d) $f''(x) > 0 = (6, 4)$

$f''(x) < 0 = (4, 8)$

3. $y = 2x^3 + 3x^2 - 12x + 9$

$\frac{dy}{dx} = 6x^2 + 6x - 12$

$6x^2 + 6x - 12 = 0$

$x^2 + x - 2 = 0$

$(x - 1)(x + 2) = 0$

$x = 1$ or $x = -2$

4. (a) $f(x) = (x-2)(x+4)$

$f'(x) = 1(x+4) + 1(x-2)$

$= x + 4 + x - 2 = 2x + 2$

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

$g'(x) = \frac{x(10x-2) - (5x^2 - 2x + 3)}{x^2}$

$= \frac{10x^2 - 2x - 5x^2 + 2x - 3}{x^2} = \frac{5x^2 - 3}{x^2}$

(c) $h(x) = x^4 - 5e^x + 2x^2$

$h'(x) = 4x^3 - 5e^x + 4x$