Review and Preview to Chapter 5

Intercepts

To find the x-intercepts of $y = f(x)$, set $y = 0$ and solve for x.
To find the y-intercept of $y = f(x)$, set $x = 0$ and solve for y.

Exercise 1

1. Find the intercepts of the following curves.

a) $y = 25 - 4x^2$

$y\text{-int}: (0, 25)$
$x\text{-int}: (\pm \frac{5}{2}, 0)$

$0 = (5 - 2x)(5 + 2x)$

b) $y = 2x^2 - x - 1$

$y\text{-int}: (0, -1)$
$x\text{-int}: (-\frac{1}{2}, 0) \ (1, 0)$

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

c) $y = \dfrac{x^2 + 2x - 3}{x^2 + 1}$ → $\dfrac{(x + 3)(x - 1)}{x^2 + 1}$

$y\text{-int}: (0, -3)$
$x\text{-int}: (-3, 0) \ (1, 0)$

d) $y = x^2 + x + 1$

$y\text{-int}: (0, 1)$
$x\text{-int}: \text{NONE}$

↓

Quad Eqⁿ

$\dfrac{-1 \pm \sqrt{1^2 - 4(1)(1)}}{2(1)}$ → $\dfrac{-1 \pm \sqrt{-3}}{2}$

e) $y = 3x^2 + 4x - 6$

$y\text{-int}: (0, -6)$
$x\text{-int}: \left(\dfrac{-2 \pm \sqrt{22}}{3}, 0\right)$

$\dfrac{-4 \pm \sqrt{16 - 4(3)(-6)}}{2(3)}$

$\dfrac{-4 \pm \sqrt{88}}{6}$ → $\dfrac{-4 \pm 2\sqrt{22}}{6}$

$\dfrac{-2 \pm \sqrt{22}}{3}$

f) $y = x^3 - 3x$

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

$x^2 - 3 = 0$

$(x + \sqrt{3})(x - \sqrt{3})$

$y\text{-int}: (0, 0)$
$x\text{-int}: (\pm \sqrt{3}, 0)$

1

g) $y = x^3 - x^2 - x + 1$

$x^2(x-1) - 1(x-1)$

$(x^2-1)(x-1)$

$(x+1)(x-1)(x-1)$

$y\text{-}int: (0,1)$
$x\text{-}int: (\pm 1, 0)$

h) $y = 2x^3 - 9x^2 - 18x$

$= x(2x^2 - 9x - 18)$

$(2x+3)(x-6)$

$y\text{-}int: (0,0)$
$x\text{-}int: (0,0)\ (6,0)\ \left(-\frac{3}{2}, 0\right)$

i) $y = x^3 + 8$

$(x+2)(x^2 - 2x + 4)$

$y\text{-}int: (0,8)$
$x\text{-}int: (-2,0)$

j) $y = x^4 - 16$

$(x^2 - 4)(x^2 + 4)$

$(x-2)(x+2)(x^2+4)$

$y\text{-}int: (0,-16)$
$x\text{-}int: (\pm 2, 0)$

2. Find the intercepts of the curve $y = 9x - x^3$ and then use the strategies from Section 4 to sketch the curve.

$y = x(9 - x^2)$

$x(3-x)(3+x)$

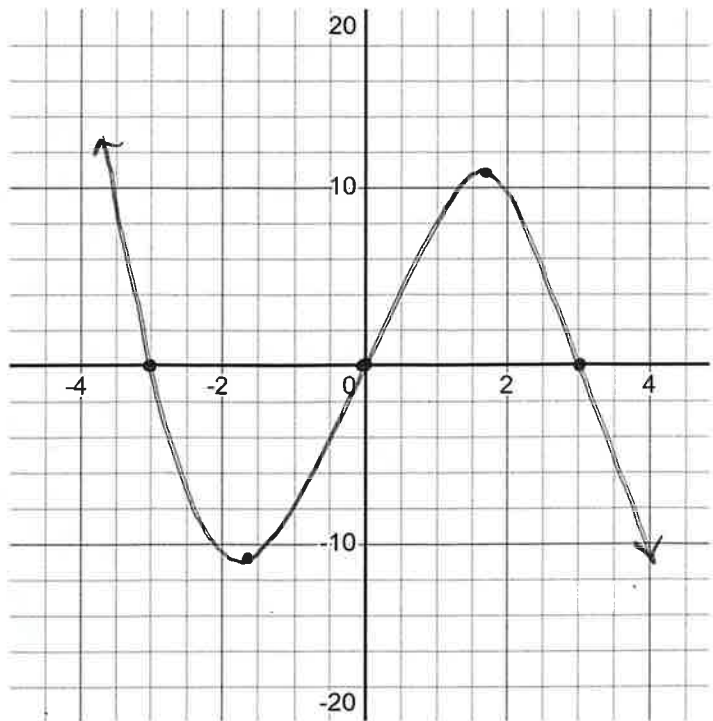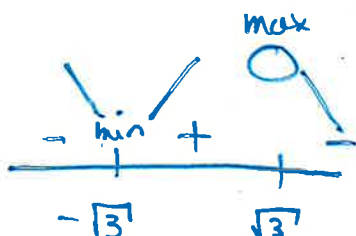$y\text{-}int: (0,0)$
$x\text{-}int: (0,0)$
$(3,0)$
$(-3,0)$

$y' = 9 - 3x^2$

$0 = 9 - 3x^2$

$3x^2 = 9$

$x^2 = 3$

$x = \pm\sqrt{3}$

max

$-\quad min \quad +$

$-\sqrt{3} \qquad \sqrt{3}$

$f(-\sqrt{3}) \doteq -10.4$

2   $f(\sqrt{3}) \doteq 10.4$