College Algebra — Handout
MAT 140 — D. Ivanšić

All our formulas

Rules for exponents:

$a^{-n} = \dfrac{1}{a^n}$

$a^m \cdot a^n = a^{m+n}$

$\dfrac{a^m}{a^n} = a^{m-n}$

$(a^m)^n = a^{mn}$

$(ab)^m = a^m b^m$

$\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m}$

Algebraic expressions:

$(a+b)^2 = a^2 + 2ab + b^2$ — square of a sum

$(a-b)^2 = a^2 - 2ab + b^2$ — square of a difference

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ — cube of a sum

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$ — cube of a difference

$a^2 - b^2 = (a-b)(a+b)$ — difference of squares

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$ — difference of cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ — sum of cubes

Rules for roots:

$\sqrt[n]{ab} = \sqrt[n]{a}\sqrt[n]{b}$

$\sqrt[n]{\dfrac{a}{b}} = \dfrac{\sqrt[n]{a}}{\sqrt[n]{b}}$

$\sqrt[n]{a^n} = |a|$, for even n

$\sqrt[n]{a^n} = a$, for odd n

$a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$

Circles and lines:

$(x-h)^2 + (y-k)^2 = r^2$ — circle with center (h,k) and radius r

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ — slope of line through (x_1, y_1) and (x_2, y_2)

$y = mx + b$ — line with slope m and y-intercept b

$y - y_1 = m(x - x_1)$ — line with slope m through (x_1, y_1)

Distance and midpoint

$d = |a-b|$ — distance between real numbers a and b

$m = \dfrac{a+b}{2}$ — midpoint of real numbers a and b

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ — distance between points in the plane (x_1, y_1) and (x_2, y_2)

$M = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$ — midpoint of points in the plane (x_1, y_1) and (x_2, y_2)

Rules for logarithms:

$\log_a a^x = x \qquad a^{\log_a x} = x$

$\log_b M = \dfrac{\log_a M}{\log_a b}$

$\log_a(MN) = \log_a M + \log_a N$

$\log_a \left(\dfrac{M}{N}\right) = \log_a M - \log_a N$

$\log_a M^p = p \cdot \log_a M$

Quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Even, odd functions:

If $f(-x) = f(x)$, f is even

If $f(-x) = -f(x)$, f is odd

Compound interest:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$