### MAC 1105 Formulas

| **Slope of a line** | $m = \frac{y_2-y_1}{x_2-x_1}$ |
| **Slope-intercept form** | $y = mx + b$ |
| **Point-slope form** | $y - y_1 = m(x - x_1)$ or $y = m(x-x_1) + y_1$ |
| **Slope of parallel lines** | $m_1 = m_2$ |
| **Slope of perpendicular lines** | $m_2 = \frac{-1}{m_1}$ or opposite reciprocal |
| **Special lines** | $y = b$; horizontal line, $x = a$; vertical line |
| **Quadratic formula** | Given $ax^2 + bx + c = 0$; $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ |
| **Vertex** | $(x-h)^2 + (y-k)^2 = r^2$, $(h,k)$ is the center, $r$ is the radius |
| **Distance** | $d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$ |
| **Midpoint** | $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$ |
| **x-intercept** | Let $y = 0$; $(a, 0)$ |
| **y-intercept** | Let $x = 0$; $(0, b)$ |

### Translation rules

| $y = f(x + a)$ | a units to the left |
| $y = f(x - a)$ | a units to the right |
| $y = f(x) + a$ | a units up |
| $y = f(x) - a$ | a units down |
| $y = -f(x)$ | Reflected over the x axis |
| $y = f(-x)$ | Reflected over the y axis |
| Is $f(x) = f(-x)$ | Symmetric to the y axis |
| Is $f(x) = -f(x)$ | Symmetric to the x axis |
| Is $f(x) = -f(-x)$ | Symmetric to the origin |

### Logarithm rules

| $\log_a mn = \log_a m + \log_a n$ |
| $\log_a \frac{m}{n} = \log_a m - \log_a n$ |
| $\log_a m^p = p \log_a m$ |
| $\log_a a^x = x$ |
| $\log_a m = \frac{\log m}{\log a} = \frac{\ln m}{\ln a}$ |
| $\ln e^x = x$ and $e^{\ln x} = x$ |
| $\log_a a^x = x$ and $a^{\log_a x} = x$ |
| If $a^x = a^y; a \neq 0$, then $x = y$ |
| $\log_a m = \log_a n; m, n > 0$, then $m = n$ |
| $\log_a a = 1$ and $\ln e = 1$ |

### Exponent Rules

| $m^a m^b = m^{a+b}$ | $(a^m)^b = a^{mb}$ |
| $m^a / m^b = m^{a-b}$ | $m^{-a} = 1 / m^a$ |
| $m^0 = 1$ | $\sqrt[n]{m^a} = m^{a/n}$ |
| $n$ even, $\sqrt[n]{a^n} = |a|$ | $n$ odd, $\sqrt[n]{a^n} = a$ |
| $i = \sqrt{-1}$ | $i^2 = -1$ |
| $\sqrt{-m} = i\sqrt{m}$ |