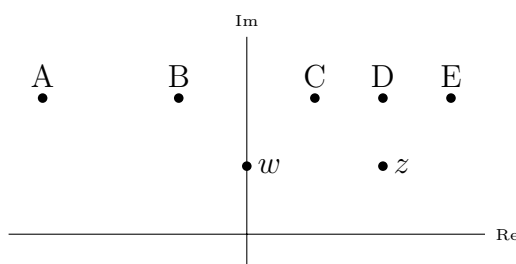


List 2

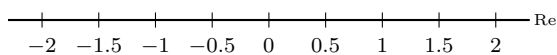
Complex numbers, intro to polynomials.

12. For $z = \frac{\sqrt{7}}{2} + \frac{\sqrt{11}}{3}i$, calculate $z + \bar{z}$.
13. For $z = 9e^{(\pi/8)i}$, calculate $z \cdot \bar{z}$.
14. For $z = 6e^{(\pi/52)i}$ and $w = 3e^{(-\pi/52)i}$, calculate zw . Give your answer in rectangular form.
15. For $z = 1 + i$ and $w = e^{(\pi/4)i}$, calculate

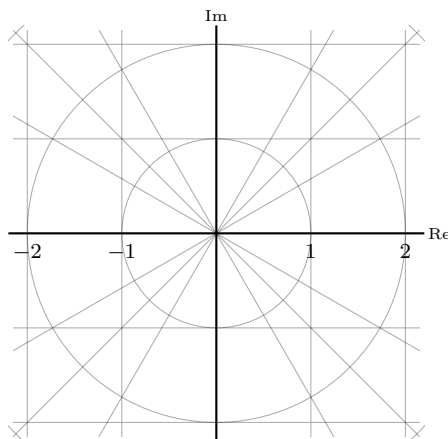
(a) $\arg(z)$	(e) $ w $	(i) zw
(b) $\arg(w)$	(f) $ z - w $	(j) z/w
(c) $\arg(zw)$	(g) $ zw $	(k) $z\bar{w}$
(d) $z + w$	(h) $ z/w $	(l) $\bar{z}w$
16. Which of the points A - E below could be $z + w$? Which could be zw ?



17. Write $(1+i)^{11}$ and $\left(\frac{\sqrt{3}-i}{1+i}\right)^6$ in rectangular form. (Hint: use de Moivre's formula.)
18. (a) On a real number line (like the blank one shown below), put a dot at every point x for which $x^6 = 1$.



- (b) On a complex plane (like the blank one shown below), put a dot at every point z for which $z^6 = 1$.



19. A cannonball fired at 400 m/s at an angle of 52° will have an initial vertical velocity of $400 \sin(52^\circ) \approx 315.2$ m/s, and it will have a height of

$$h(t) = -\frac{9.8}{2}t^2 + 315.2t$$

meters after t seconds. How many seconds will it take for the cannonball to reach the ground?

20. If the width of a rectangle is 5 m more than its length, and the rectangle's area is 84 m^2 , what are the length and width of the rectangle?
21. The product of two positive consecutive¹ integers is 380. Find the two numbers.

A **polynomial** in the variable x is a function that can be written in the form

$$_ x^n + _ x^{n-1} + \cdots + _ x^2 + _ x + _,$$

where each blank—called a **coefficient**—is a real or complex number (possibly including 0). The **degree** of a polynomial in x is the highest power of x that has a non-zero coefficient.

22. For each of the following, give the degree if the expression is a polynomial in x , and otherwise write “not a polynomial”.

(a) $\frac{5}{2}x^3 - 7x + 8$

(f) $5x$

(b) $9x^{10}$

(g) 5

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

(h) $\frac{8x + 1}{2x}$

(d) $3x^2 + \sin(x)$

(e) $(x^2 + 2x - 1)^3$

(i) $\frac{x^3 + 7x}{2}$

¹For example, the numbers 107 and 108 are consecutive.