

### Mixed Review

This isn't a comprehensive list – but I would make sure that I could do each of these problems.

1. Solve  $\log x + \log(x + 3) = 1$
2. Solve  $5^{2x} = 2^{x+1}$
3. Find  $S_{15}$  for the series  $2 + 5 + 8 + \dots$
4. Find the 12th term for the sequence  $4, -2, 1, \dots$
5. What is the infinite sum ( $S_{\infty}$ ) of  $4 - 2 + 1 - \dots$ ?
6. Find the partial fraction decomposition of  $\frac{4}{x^2 - 1}$ .
7. Find the angle between the vectors  $\vec{a}$  and  $\vec{b}$  if  $\vec{a} = 5\vec{i} + 6\vec{j}$  and  $\vec{b} = 7\vec{i} - 8\vec{j}$ .
8. Find the angle between the vectors  $\vec{a}$  and  $\vec{b}$  if  $\vec{a} = 3\vec{i}$  and  $\vec{b} = -5\vec{j}$ .
9. If  $z = 40\left(\cos\frac{4\pi}{5} + i\sin\frac{4\pi}{5}\right)$  and  $w = 5\left(\cos\frac{3\pi}{5} + i\sin\frac{3\pi}{5}\right)$ , find  $zw$  (in other words  $z$  times  $w$ ).
10. Find  $(-1 + i)^6$ . Use DeMoivre's formula.
11. Solve  $3\sin^2 x - 5\sin x - 2 = 0$  with  $x$  in  $[0, 2\pi)$
12. What are the foci of the hyperbola  $\frac{(x-2)^2}{4^2} - \frac{(y-1)^2}{3^2} = 1$ ?
13. Write the equation of an ellipse with center at  $(1, -1)$  foci at  $(1, -1 \pm \sqrt{5})$  and one vertex at  $(1, 2)$ .
14. What is the equation in polar coordinates of a circle centered at the origin with a radius of  $\sqrt{7}$ ?