

## Quiz 9

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Find all the intervals where the function  $f(x) = x^3 - 6x^2 + 9x$  is increasing.

**Solution:** Note that  $f'(x) = 3x^2 - 12x + 9$ . We need to find the intervals over which  $f'(x) > 0$ . Factoring  $f'$  yields  $3(x - 1)(x - 3) > 0$ . So we can use the Test Interval Technique with the test intervals  $(-\infty, 1)$ ,  $(1, 3)$ , and  $(3, \infty)$ . Checking the points  $x = 0$ ,  $x = 2$ , and  $x = 4$ , we see that  $f'(x) > 0$  over the first and last intervals. Thus  $f$  is increasing on the intervals  $(-\infty, 1)$  and  $(3, \infty)$ .