Work on these with your partner(s) at the board

1. Let $f(x) = x^3 - 3x^2 + x + 1$
   (a) Show that there is a point between $x = -2$ and $x = 1$ where $f(x) = -10$
   (b) Show that $f(x)$ has a root between $x = 2$ and $x = 4$
   (c) Approximate the value of the root in (b) accurate to within 0.1 of its exact value

2. If $g'(x) = x\sin(x^2) + 1$, show that $g(x)$ has a local maximum between $x = 1$ and $x = 2$. *Hint: Show g is increasing at $x = 1$, decreasing at $x = 2$, and use the IVT to show $g' = 0$ between $x = 1$ and $x = 2$*

3. Find the following limits:

   (a) $\lim_{x\to\infty} \frac{5}{x+2}$ (b) $\lim_{x\to\infty} \frac{5x}{2x+2}$ (c) $\lim_{x\to\infty} \frac{5x^2+3}{2x^2+x+2}$ (d) $\lim_{x\to\infty} \frac{5x^3}{2x^2+2}$