MATH1220: Midterm 2 Practice Problems

The following are practice problems for the second exam.

1. Evaluate the following integrals:
   (a) $\int xe^{3x}\,dx$
   (b) $\int x^2\cos x\,dx$
   (c) $\int \cos^3 x\,dx$
   (d) $\int \tan^4(2x)\,dx$
   (e) $\int \sin(3x)\sin(9x)\,dx$
   (f) $\int \dfrac{x^2\,dx}{\sqrt{16-x^2}}$
   (g) $\int \dfrac{dx}{\sqrt{x^2+4x+5}}$
   (h) $\int \dfrac{x}{4x-x^2}dx$
   (i) $\int \dfrac{5x}{2x^3+6x^2}dx$
   (j) $\int \dfrac{x^3+x^2}{x^2+5x+6}$
   (k) $\int \dfrac{3x+13}{x^2+4x+3}dx$
2. Compute the following limits:
   (a) $\lim\limits_{x\to 1}\dfrac{x^2-2x+1}{\sin(\pi x)}$
   (b) $\lim\limits_{x\to 0}\dfrac{e^x-e^{-x}}{2\sin x}$
3. Find an algebraic expression for $\tan(\sin^{-1}(x/3))$.