7. Recall that using the method of Partial Fraction Decomposition can be used to convert a rational function $\frac{p(x)}{q(x)}$ into a sum of simpler functions, each of which can easily be integrated.

   a. Given that $\frac{x-1}{x^2+x-12} = \frac{A}{x+4} + \frac{B}{x-3}$, find the value of the constants A and B

   b. Given that $\frac{x}{(x+2)(x-1)^2} = -\frac{2}{9(x+2)} + \frac{2}{9(x-1)} + \frac{1}{3(x-1)^2}$, compute $\int \frac{x}{(x+2)(x-1)^2} dx$

8. Integrate using any method:

   a) $\int_0^1 x^3 e^{x^4} dx$

   b) $\int \frac{1}{x\sqrt{1-x^2}} dx$ (you could use $\int \sec(x)dx = \ln(\sec(x) + \tan(x))$ or $\int \csc(x)dx = \ln(\csc(x) - \cot(x))$

c) $\int x\sin(x)dx$

d) $\int \cos^2(x)\sin^3(x)dx$

e) $\int_0^{\infty} \frac{2x}{\left(x^2+5\right)^2}dx$

f) $\int_{-2}^{2} \frac{1}{(x+1)^2}dx$

9. Please find the following limits (you might find l'Hospital's rule helpful for *some* limits)

a) $\lim_{x\to 0} \frac{\sin(x)}{1+x}$

b) $\lim_{x\to 1} \frac{1-x+\ln(x)}{1-\sin(\frac{\pi}{2}x)}$

c) $\lim_{x\to \infty} \frac{x^2-3x+2}{2-x^2}$

d) $\lim_{x\to 0^+} x\ln(x)$

EXTRA CREDIT: Find $\int \arctan(x)dx$