

## MAT 126: PROBLEM SET 2

0. Warm-up:

(a)  $\int [x^5 + 3x^2 + x + 7] dx$  – by inspection

(b)  $\int \cos(2x) dx$  – by substitution

(c)  $\int xe^x dx$  – by parts

(d)  $\int \frac{1}{x^2 - 1} dx$  – by partial fractions

1. The following integrals may be solved by pure algebra:

(a)  $\int \frac{1}{\sqrt{x-1} + \sqrt{x+1}} dx$

(b)  $\int \frac{8x^2 + 6x + 4}{x + 1} dx$

(c)  $\int \tan^2(x) dx$

(d)  $\int \frac{1}{1 + \sin(x)} dx$

2. The following integrals are to be solved by substitution:

(a)  $\int \frac{e^x}{e^{2x} + 2e^x + 1} dx$

(b)  $\int \frac{x}{\sqrt{1-x^4}} dx$

(c)  $\int \log(\cos(x)) \tan(x) dx$

3. The following integrals are to be solved by parts:

(a)  $\int \sqrt{x} \log(x) dx$

(b)  $\int x^2 e^x dx$

(c)  $\int \log^3(x) dx$

(d)  $\int \sec^3(x) dx$  HINT:  $\int \sec(x) dx = \log(\sec(x) + \tan(x)) + C.$

4. Here are some integrals of rational functions:

(a)  $\int \frac{x+4}{x^2+1} dx$

(b)  $\int \frac{2x^2+7x-1}{x^3+x^2-x-1} dx$

(c)  $\int \frac{x^3+x+2}{x^4+2x^2+1} dx$