

Homework 2 — MATH 1586 Spring 2018

1. Compute  $\int e^{12x} dx$ .
2. Compute  $\int (t^3 - 2t)^{25} (3t^2 - 2) dt$ .
3. Compute  $\int \frac{z^4}{1 - z^5} dz$ .
4. Compute  $\int \frac{5}{w - 3} dw$ .
5. Compute  $\int q^2 e^{q^3 - 1} dq$ .
6. In calm waters, the oil spilling from the ruptured hull of a grounded tanker forms an oil slick that is circular in shape. If the radius  $r$  of the circle is increasing at a rate of

$$r'(t) = \frac{30}{\sqrt{2t + 4}} \frac{\text{ft}}{\text{min}}$$

$t$  minutes after the rupture occurs, find an expression for the radius at any time  $t$ . How large is the polluted area 16 minutes after the rupture occurred? (*note*:  $r(0) = 0$ )

7. Suppose that in a certain country, the life expectancy at birth of a female is changing at the rate of

$$g'(t) = \frac{5.45218}{(1 + 1.09t)^{0.9}} \frac{\text{years}}{\text{year}}.$$

Here  $t$  is measured in years with  $t = 0$  corresponding to the beginning of the year 1900. Find an expression  $g(t)$  giving the life expectancy at birth (in years) of a female in that country if the life expectancy at the beginning of 1900 is 50.02 years. What is the life expectancy at birth of a female born in the year 2000 according to this model?