

## Math 142 In Class Exam 3 Review

1. Find each indefinite integral.

a)  $\int x^2(x^3 + 5)^4 dx$       b)  $\int (x^3 + 2x)(x^3 + 7) dx$

c)  $\int \frac{12x^2 + 8x}{x^3 + x^2 + 20} dx$       d)  $\int \frac{x^3 + 20}{9x^2} dx$

e)  $\int (x+5)^2 \sqrt{x-2} dx$       f)  $\int (x^4 + 2x)e^{x^5 + 5x^2 + 12} dx$

2. a) A marginal average profit function is  $MAP = -0.15 - \frac{3000}{x}$

The average profit per unit if 100 units are produced is \$55. Find the profit function.

b) Find  $y(t)$  if  $\frac{dy}{dt} = \frac{t}{t^2 + 1}$  and  $y(0) = 6$ .

c) Find  $y(t)$  if  $\frac{dy}{dt} = 4te^{t^2}$  and  $y(0) = -3$

3. Find the left and right hand Riemann sums using 5 equal subintervals of  $[1, 3]$  for

$$f(x) = \frac{1}{x}.$$

4. Show that  $xe^x - e^x$  is an antiderivative for  $xe^x$  and evaluate  $\int_a^b xe^x dx$ .

5. Evaluate each.

a)  $\int_{-1}^4 f(x) dx$        $f(x) = \begin{cases} \sqrt{1-x^2} & -1 \leq x \leq 1 \\ x-1 & 1 < x \end{cases}$

b)  $\int_{-4}^4 t\sqrt{t^2 + 1} dt$

c)  $\frac{d}{dx} \left[ \int_0^x e^{t^2} dt \right]$       d)  $\int_0^x \frac{d}{dt} (e^{t^2}) dt$

6. a) Find the area between the graphs of  $f(x) = 2x^2 - 7x - 12$  and  $g(x) = x^2 - 6x$  for  $x$  between -5 and 5.

b) Find the area between the graphs of  $f(x) = 2x^2 - 7x - 12$  and  $g(x) = x^2 - 6x$ .

7. Find the consumer surplus and producer surplus at equilibrium for demand and supply prices

a)  $D(x) = 46 - 0.02x^2$      $S(x) = 10 + 0.02x^2$

b)  $D(x) = 46 - 0.01x^2$      $S(x) = 10 + 0.03x^2$