# Math 1712 - Spring 2013
## Quiz 5 - Show your work

Name: _____     TA: _____

1. (10 points) Evaluate the following indefinite integrals:

a. $\displaystyle\int \frac{5}{\sqrt[3]{x}}\,dx$

$$\int \frac{5}{\sqrt[3]{x}}\,dx = \int 5\,x^{-\frac{1}{3}}\,dx = 5\,\frac{x^{\frac{2}{3}}}{\frac{2}{3}} + C = \frac{15}{2}x^{\frac{2}{3}} + C$$

b. $\displaystyle\int \left(2\,x^3 - 4e^{2x}\right)\,dx$

$$\int \left(2\,x^3 - 4e^{2x}\right)\,dx = \frac{2\,x^4}{4} - \frac{4}{2}e^{2x} + C = \frac{x^4}{2} - 2e^{2x} + C$$

c. $\displaystyle\int \left(\frac{1}{x^2} - \frac{3}{x}\right)\,dx$

$$\int \left(\frac{1}{x^2} - \frac{3}{x}\right)\,dx = \int \left(x^{-2} - \frac{3}{x}\right)\,dx = \frac{x^{-1}}{-1} - 3\ln(x) + C = -\frac{1}{x} - 3\ln(x) + C$$

2. (10 points) Evaluate the following definite integrals:

a. $\displaystyle\int_{-1}^{3} \left(t^2 - 2\right)\,dt = \left(\frac{t^3}{3} - 2\,t\right)\Big| = \left(\frac{27}{3} - 6\right) - \left(-\frac{1}{3} + 2\right) = \frac{4}{3}$

b. $\displaystyle\int_{0}^{1} e^{\frac{1}{3}x}\,dx = 3e^{\frac{1}{3}x}\Big| = 3e^{\frac{1}{3}} - 3e^0 = 3e^{\frac{1}{3}} - 3$

Leave your answer in the form of an exact answer; that is, **do not** estimate the answer using your calculator.

3. (10 points) The XYZ Company determines that it's marginal cost function is given by: $x^3 - x$ and that it's fixed costs are \$ 6,500, where costs are in dollars and $x$ is the number of unit produced. Find the total cost function $C(x)$.

$$MCF = C'(x) = x^3 - x \implies C(x) = \int (x^3 - x)\ dx = \frac{x^4}{4} - \frac{x^2}{2} + K$$

**Fixed costs** $= 6500 \implies x = 0 \implies 6500 = 0 - 0 + K \implies K = 6500$

$$\implies C(x) = \frac{x^4}{4} - \frac{x^2}{2} + 6500$$