

MATH 114 - QUIZ 7 - 7 MARCH 2013

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (10 pts.) Compute the integral  $\int \frac{x}{(x+2)^2(x+1)} dx$  using partial fractions.

$$\frac{x}{(x+2)^2(x+1)} = \frac{A}{x+2} + \frac{B}{(x+2)^2} + \frac{C}{x+1} = \frac{A(x+2)(x+1) + B(x+1) + C(x+2)^2}{(x+2)^2(x+1)}$$

$$\therefore x = A(x+2)(x+1) + B(x+1) + C(x+2)^2$$

$$x = -1: \quad -1 = C \rightarrow \underline{C = -1}$$

$$x = -2: \quad -2 = -B \rightarrow \underline{B = 2}$$

$$x = 0: \quad 0 = 2A + B + 4C$$

$$= 2A + 2 - 4 \rightarrow \underline{A = 1}$$

$$= 2A - 2$$

$$\int \frac{x}{(x+2)^2(x+1)} dx = \int \frac{1}{x+2} dx + \int \frac{2}{(x+2)^2} dx - \int \frac{1}{x+1} dx$$

$$= \ln|x+2| - \frac{2}{x+2} - \ln|x+1| + C$$

$$= \ln \left| \frac{x+2}{x+1} \right| - \frac{2}{x+2} + C //$$

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Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (10 pts.) Compute the integral  $\int \frac{x+4}{x(x+2)^2} dx$  using partial fractions.

$$\frac{x+4}{x(x+2)^2} = \frac{A}{x} + \frac{B}{x+2} + \frac{C}{(x+2)^2} = \frac{A(x+2)^2 + Bx(x+2) + Cx}{x(x+2)^2}$$

$$\therefore x+4 = A(x+2)^2 + Bx(x+2) + Cx$$

$$x=0: \quad 4 = 4A \rightarrow A=1$$

$$x=-2: \quad 2 = -2C \rightarrow C=-1 //$$

$$x=1: \quad 5 = 9A + 3B + C$$

$$= 9 + 3B - 1 \rightarrow B = -1 //$$

$$= 8 + 3B$$

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

$$= \ln|x| - \ln|x+2| + \frac{1}{x+2} + C$$

$$= \ln \left| \frac{x}{x+2} \right| + \frac{1}{x+2} + C //$$

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Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (10 pts.) Compute the integral  $\int \frac{x+2}{x^2(x+1)} dx$  using partial fractions.

$$\frac{x+2}{x^2(x+1)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x+1} = \frac{Ax(x+1) + B(x+1) + Cx^2}{x^2(x+1)}$$

$$\therefore x+2 = Ax(x+1) + B(x+1) + Cx^2$$

$$x=0: 2 = \cancel{2}B \longrightarrow B=2$$

$$x=-1: 1 = C \longrightarrow C=1 //$$

$$\begin{aligned} x=1: 3 &= 2A + 2B + C \\ &= 2A + 4 + 1 \longrightarrow A = -1/ \\ &= 2A + 5 \end{aligned}$$

$$\int \frac{x+2}{x^2(x+1)} dx = \int \frac{-1}{x} dx + \int \frac{2}{x^2} dx + \int \frac{1}{x+1} dx$$

$$= -\ln|x| - \frac{2}{x} + \ln|x+1| + C$$

$$= \ln \left| \frac{x+1}{x} \right| - \frac{2}{x} + C //$$