MATH 152

Today

1. Brief exam discussion
2. 6.2 Trigonometric integrals

Goals:

1. 6.3 Partial Fraction Decomposition (Understand the types of decompositions and how to find them)

Where is today's material used?

1. Physics: distance traveled by a particle (among many others)
2. Chemistry: fraction of gas molecules that can participate in a reaction (among many others)
3. Economics: finding total cost given marginal cost (among many others)
4. Any discipline that includes a notion of accumulated change.

6.3 Partial Fraction Decomposition

1. We attempt to use the fact that $\frac{a}{b}+\frac{c}{d}=\frac{ad+bc}{bd}$ in reverse to separate a rational function whose denominator factors into a sum of two rational functions with "simpler" denominators."
2. Essential fact: every polynomial with real coefficients can be factored as a product of linear and/or irreducible quadratic factors.
3. If the numerator has degree greater than or equal to that of the denominator, divide first.
4. In what follows, L_k always refers to a linear polynomial and Q_k to a quadratic polynomial. A, B, C, etc. are constants. $P(x)$ is a polynomial of degree less than that of the denominator in each case.

(a) $\dfrac{P(x)}{L_1 L_2} = \dfrac{A}{L_1} + \dfrac{B}{L_2}$

(b) $\dfrac{P(x)}{L_1^n} = \dfrac{A_1}{L_1} + \dfrac{A_2}{L_1^2} + \ldots + \dfrac{A_n}{L_1^n}.$

(c) $\dfrac{P(x)}{Q_1^n} = \dfrac{A_1 x + B_1}{Q_1} + \dfrac{A_2 x + B_2}{Q_1^2} + \ldots + \dfrac{A_n x + B_n}{Q_1^n}.$

(d) $\dfrac{P(x)}{L_1 Q_1} = \dfrac{A}{L_1} + \dfrac{Bx + C}{Q_1}$

(e) $\dfrac{P(x)}{Q_1 Q_2} = \dfrac{Ax + B}{Q_1} + \dfrac{Cx + D}{Q_2}$

(f) These can be used in combination, as well.

5. Examples: 6.3, p. 334: 1-6, 7-34

Next Time

1. Turn in WeBWorK 6.3, Set09.5-PartialFractions: 3, 5